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Report No. D-2010-039

January 29, 2010

Inspector General

United States
Department *of* Defense



Recapitalization and Acquisition of Light Tactical Wheeled Vehicles (U)

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(U) Acronyms and Abbreviations

ACAT	Acquisition Category
ECV	Expanded Capacity Vehicle
ECV2	Next Generation Expanded Capacity Vehicle
FAR	Federal Acquisition Regulation
HMMWV	High Mobility Multi-Purpose Wheeled Vehicle
IED	Improvised Explosive Device
IR&D	Independent Research and Development
JLTV	Joint Light Tactical Vehicle
M-ATV	Mine Resistant Ambush Protected-All-Terrain Vehicle

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INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202-4704

January 29, 2010

MEMORANDUM FOR DIRECTOR, OPERATIONAL TEST AND EVALUATION
AUDITOR GENERAL, DEPARTMENT OF THE ARMY

SUBJECT: (U) Recapitalization and Acquisition of Light Tactical Wheeled Vehicles
(Report No. D-2010-039)

(U) We are providing this report for review and comment. We considered management comments on a draft of this report in preparing the final report.

(U) DOD Directive 7650.3 requires that recommendations be resolved promptly. The comments from the Director, Operational Test and Evaluation, and the Commanding General, U.S. Army Training and Doctrine Command, were responsive. We revised two recommendations to ensure that the Army conducts live fire testing of any recapitalized HMMWV configurations under consideration and the DOD has oversight over those tests. The comments from the Deputy for Acquisition and Systems Management, Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) were not responsive for Recommendations A.1.a, A.1.b, and A.1.c. As a result, we request additional comments from the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) as indicated in the table on page ii by March 1, 2010.

(U) If possible, send a .pdf file containing your comments to audacm@dodig.mil. Copies of your comments must have the actual signature of the authorizing official for your organization. We are unable to accept the /Signed/ symbol in place of the actual signature. If you arrange to send classified comments electronically, you must send them over the SECRET Internet Protocol Router Network (SIPRNET).

(U) We appreciate the courtesies extended to the staff. Please direct questions to Mr. Richard B. Jolliffe at (703) 604-9201 (DSN 664-9201).

A handwritten signature in black ink, appearing to read "Mary L. Ugone", is positioned above the typed name.

Mary L. Ugone
Deputy Inspector General
for Auditing

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Results in Brief: Recapitalization and Acquisition of Light Tactical Wheeled Vehicles (U)

What We Did (U)

(U) We determined whether the Army effectively managed efforts to develop, test, and acquire armor solutions for light tactical wheeled vehicles. Specifically, we reviewed the Army's acquisition actions for the Risk Reduction Vehicle (XM1166) and the Next Generation Expanded Capacity Vehicle (ECV2) and the Army's plan for the recapitalization of the High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) fleet.

What We Found (U)

~~(FOUO)~~ The HMMWV recapitalization program may significantly improve crew survivability from [REDACTED] by using the semimonocoque cab of the XM1166, or similar configuration, for recapitalizing vehicles. However, the Project Manager for Tactical Vehicles (Project Manager) stopped the testing on the XM1166 and did not assess the feasibility of recapitalizing other HMMWV models to the XM1166 configuration.*

(U) The Project Manager planned to acquire 11,500 ECV2s at an estimated cost of \$3.84 billion without establishing the ECV2 Program as a new start acquisition program, without planning to conduct full and open competition, and without determining the ECV2's capabilities compared with those of current and planned light tactical wheeled vehicles. The Under Secretary of Defense for Acquisition, Technology, and Logistics was not informed, as required, of this acquisition. The Project Manager risked procuring a vehicle that duplicated existing capabilities and had vulnerabilities that other vehicles are being procured to mitigate. During the audit and after our discussions, the Project Manager decided to stop the ECV2 Program because the Army Deputy Chief of Staff (G-8) decided not to invest in it. As a result, the Army put \$3.84 billion in Other Procurement, Army funding to better use for FY 2010 through FY 2013.

(U) On November 20, 2009, the Under Secretary of Defense for Acquisition, Technology, and Logistics designated the HMMWV Program an Acquisition Category IC major Defense acquisition program. He also required the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) to notify him if the Army plans to procure a new model or variant of the HMMWV.

(U) The Project Manager's actions show an internal control weakness in oversight by the Program Executive Office for Combat Support and Combat Service Support.

What We Recommend (U)

~~(FOUO)~~ The Assistant Secretary of the Army (Acquisition, Logistics, and Technology) should direct the Program Executive Officer for Combat Support and Combat Service Support to continue live fire tests on the XM1166 and any other HMMWV recapitalization configurations under consideration to ensure the results are comparable with the M1151-model HMMWV; assess the feasibility of recapitalizing HMMWVs currently in use to the XM1166 or similar configuration; and, if feasible, recapitalize current HMMWVs to the XM1166, or similar, configuration to better protect against [REDACTED]

The Director, Operational Test and Evaluation, should add all recapitalized HMMWV configurations to the Office of the Secretary of Defense Test and Evaluation Oversight List for live fire test and evaluation oversight.*

(U) The Assistant Secretary of the Army (Acquisition, Logistics, and Technology), in coordination with the Commanding General, U.S. Army Training and Doctrine Command, should analyze the capabilities of currently fielded and future light tactical wheeled vehicles as part of the Joint Capabilities Integration and Development System process to determine the need for the ECV2. We also recommend that the Assistant Secretary designate any future ECV2 Program as a new start and, if appropriate, a major Defense acquisition program; and, if the need is justified, use full and open competition to procure the vehicles.

Management Comments and Our Response (U)

(U) With the exception of the Deputy for Acquisition and Systems Management comments responding for the Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology), report responders agreed with or met the intent of recommendations addressed to them. In finalizing the report, we revised two recommendations to ensure that the Army conducts live fire testing of any recapitalized HMMWV configurations under consideration and the DOD has oversight over those tests. We request comments as indicated in the recommendations table on page ii.

* This paragraph omitted For Official Use Only information.

Recommendations Table (U)

Management	Recommendations Requiring Comment	No Additional Comments Required
Director, Operational Test and Evaluation		A.2
Assistant Secretary of the Army (Acquisition, Logistics, and Technology)	A.1.a A.1.b A.1.c	B.1 B.2.a B.2.b
Commanding General, U.S. Army Training and Doctrine Command		B.1

(U) Please provide comments by March 1, 2010.

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Introduction (U)

Objectives (U)

(U) The objective of the audit was to determine whether the Army effectively managed efforts to develop, test, and acquire armor solutions for light tactical wheeled vehicles. Specifically, we reviewed the Army's acquisition actions concerning the Risk Reduction Vehicle (XM1166) and the Next Generation Expanded Capacity Vehicle (ECV2) and the Army's plan for the recapitalization of the High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) fleet. See Appendix A for a discussion of the scope and methodology and prior coverage related to the audit objective.

Background (U)

(U) This audit was initiated as a result of information gathered while conducting the audit that led to Report No. D2009-030, "Marine Corps Implementation of the Urgent Universal Needs Process for Mine Resistant Ambush Protected Vehicles," December 8, 2008. Specifically, the audit team was presented with information that questioned the survivability of the HMMWV from mines and improvised explosive devices (IEDs). The audit team plans to issue a second report to discuss the adequacy and oversight of live fire testing for the HMMWV Program.

High Mobility Multi-Purpose Wheeled Vehicles (U)

(U) The HMMWV is a lightweight, high-performance, four-wheel-drive, air transportable, and air droppable family of vehicles. The Army identified the need for such a vehicle in the late 1970s and issued a draft specification for the HMMWV in 1979. In May 1983, the Army awarded AM General the initial HMMWV production contract, and production began in the fall of 1984.

AM General (U)

(U) AM General is a privately held company owned by The Renco Group Inc. and MacAndres & Forbes Holdings. Once part of American Motors Corporation, AM General began designing the HMMWV in 1979 and has since sold more than 200,000 vehicles to the U.S. military and to other countries.

Management of the High Mobility Multi-Purpose Wheeled Vehicle Program (U)

(U) The Program Executive Office for Combat Support and Combat Service Support is a part of the TACOM Life Cycle Management Command, which unites all acquisition organizations that focus on soldiers and ground systems throughout the entire life cycle. The Program Executive Office's focus is on equipping and supporting the warfighter through development and fielding of systems with increased capability. The Project Manager for Tactical Vehicles (Project Manager) is part of the Program Executive Office for Combat Support and Combat Service Support and focuses on increasing the relevance

and readiness of the tactical wheeled vehicle fleet and ensuring that the best possible product is available to support the current force and beyond. The Product Manager for Light Tactical Vehicles reports to the Project Manager for Tactical Vehicles and manages the HMMWV Program.

Armor for High Mobility Multi-Purpose Wheeled Vehicles (U)

(S) In 1993, HMMWV losses during Operation Continue Hope, the follow-on mission to Operation Restore Hope, caused the Army to develop and procure an armor kit for immediate use in Somalia. The design team for the armor kit concluded that the design would require [REDACTED]

[REDACTED] In January 1994, the Army delivered 50 up-armored HMMWVs, designated XM1109s, to Somalia. Later, the Army developed the M1114 to correct XM1109 performance shortfalls, including the need for an improved chassis, air-conditioning, a turbo-charged engine, and a larger radiator. The M1114 was the first up-armored HMMWV built on the improved Expanded Capacity Vehicle (ECV) chassis. The ECV-model HMMWVs have a gross vehicle weight¹ of 12,100 pounds.^{2*}

(U) Over the past 15 years, the Army has continued to procure and field upgraded ECV-model HMMWVs to include the M1114, M1151, M1152, M1165, and M1167. Figure 1 shows an M1151 up-armored HMMWV with a fragmentation kit 5 and objective gunner's protection kit installed. As of January 2010, the Army had 33,184 up-armored HMMWVs and 113,934 nonarmored HMMWVs in its inventory.

(U) Figure 1. M1151-Model HMMWV With Fragmentation Kit 5 and Objective Gunner's Protection Kit



¹ (U) For the definition of this and other terms, see the Glossary.

² (U) The ECV-model HMMWV initially had a gross vehicle weight of 11,500 pounds, which was later increased to 12,100 pounds.

* This paragraph omitted classified information.

Risk Reduction Vehicle or XM1166 (U)

(U) In December 2004, while the Army developed the M1151-model HMMWV as a replacement for the M1114-model HMMWV, the Product Manager for Light Tactical Vehicles directed the simultaneous development of the Risk Reduction Vehicle. The Risk Reduction Vehicle, later named the XM1166, is a variant of the M1151-model HMMWV and incorporates extensive body modifications. The XM1166 has a semimonocoque welded aluminum cab built on a common ECV chassis. It improves crew survivability through significant structural improvements to the crew compartment. It has a gross vehicle weight of 12,100 pounds and was built by General Purpose Vehicles. Figure 2 shows an XM1166-model HMMWV.

(U) Figure 2. XM1166-Model HMMWV



Next Generation Expanded Capacity Vehicle (U)

(U) In March 2005, AM General began to develop the ECV2. The intent of the ECV2 Program was to restore the balance between HMMWV payload and performance while still carrying the required armor protection. The ECV2 models have a gross vehicle weight of 18,000 pounds, and variants include a command and control vehicle (XM1211), an armament carrier (XM1212), a shelter/troop carrier (XM1213), a Tube-Launched Optically-Tracked Wire Guided weapons carrier (XM1214), and an ambulance (XM1225). Figure 3 shows an XM1211 up-armored ECV2.

(U) Figure 3. XM1211-Model Up-Armored ECV2



Update of Acquisition Category (U)

(U) On March 9, 2009, the Acting Assistant Secretary of the Army (Acquisition, Logistics, and Technology) issued an acquisition decision memorandum for the HMMWV family of vehicles. The memorandum required that the Project Manager and the Program Executive Officer for Combat Support and Combat Service Support (Program Executive Officer) formally notify the Under Secretary of Defense for Acquisition, Technology, and Logistics that the HMMWV program had broken the Acquisition Category (ACAT) I program threshold and seek the appropriate ACAT reclassification.

(U) The Acting Assistant Secretary's acquisition decision memorandum also required the Project Manager and the Program Executive Officer to submit a formal request to the Under Secretary of Defense for Acquisition, Technology, and Logistics for the appropriate ACAT designation for the ECV2 family of vehicles.

(U) On May 13, 2009, the Project Manager submitted a memorandum to the Acting Assistant Secretary requesting that the HMMWV program be reclassified as an ACAT IC program. The Project Manager also stated that a requirement for ECV2 vehicles had not been established, but that, should the requirement be validated, he would submit an ACAT level recommendation to the Acting Assistant Secretary.

(U) On November 20, 2009, the Under Secretary of Defense for Acquisition, Technology, and Logistics designated the HMMWV Program an Acquisition Category IC major Defense acquisition program. He also required the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) to notify him if the Army plans to procure a new model or variant of the HMMWV.

Review of Internal Controls (U)

(U) DOD Instruction 5010.40, "Managers' Internal Control (MIC) Program Procedures," January 4, 2006, requires DOD organizations to implement a comprehensive system of internal controls that provides reasonable assurance that programs are operating as intended and to evaluate the effectiveness of the controls. We identified internal control weaknesses in acquisition planning by the Program Executive Officer. Although internal controls outlined in the DOD 5000 series of guidance were adequate for controlling acquisitions such as the ECV2 Program, the Program Executive Office for Combat Support and Combat Service Support did not use those controls. Specifically, the Project Manager for Tactical Vehicles planned to acquire the ECV2 to replace the current ECV-model HMMWV without first determining through the Joint Capabilities Integration and Development System process whether current or projected tactical wheeled vehicles already provide the capabilities planned for the ECV2 Program, without establishing the ECV2 Program as a new start, and without planning to obtain full and open competition. Implementing Recommendations B.1, B.2.a, and B.2.b will improve controls for validating need before buying a new vehicle, establishing the vehicle as a

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new start program and determining its appropriate acquisition category, and obtaining full and open competition. We will provide a copy of the report to the senior official responsible for internal controls in the Department of the Army.

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A. Recapitalization of the High Mobility Multi-Purpose Wheeled Vehicle (U)

(FOUO) The Project Manager for Tactical Vehicles (Project Manager) may be able to improve crew survivability from [REDACTED] by using the semimonocoque cab of the XM1166, or similar configuration, for recapitalizing HMMWVs. However, the Project Manager is not planning to conduct needed live fire tests of the XM1166 configuration or assess the feasibility of recapitalizing other HMMWV models to the XM1166 or similar configuration. As a result, the Project Manager is missing an opportunity to potentially enhance capabilities of the HMMWV family of vehicles and provide the warfighter riding in a HMMWV the best available protection against [REDACTED].*

Live Fire Test and Evaluation (U)

(U) DOD uses live fire tests to evaluate the vulnerability and lethality of a conventional weapon or weapon system. The conduct of live fire test and evaluation is required for covered systems or product improvements to a covered system before the milestone decision authority can approve the system to proceed beyond low-rate initial production. By law, a covered system is any vehicle, weapon platform, or conventional weapon system that includes features designed to provide some degree of protection to users in combat and that is an ACAT I or II program. The Director, Operational Test and Evaluation, is required to approve the live fire test and evaluation strategy for covered systems before the engineering and manufacturing development decision point of the acquisition process.

XM1166 Configuration (U)

(U) The XM1166 vehicle has a semimonocoque welded aluminum cab built on an ECV chassis, and the Project Manager estimates that the vehicle would cost about \$219,000 if built solely by General Purpose Vehicles.³ The cost of the XM1166 would likely drop dramatically if AM General used its HMMWV production line to produce the XM1166. The XM1166 is 528 pounds lighter than the M1151 with fragmentation kit 5⁴ under full combat load. The XM1166 doors have a fragmentation kit 5 level of protection built in. The area around the doors of the XM1166 contains the same level of protection as the

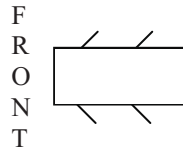
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³ (U) The Project Manager estimates that the M1151-model HMMWV with fragmentation kit 5 costs about \$195,500.

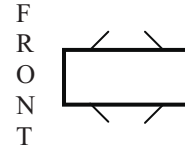
⁴ (FOUO) Fragmentation kit 5 includes [REDACTED]. Fragmentation kit 5 typically includes the [REDACTED]. Objective fragmentation kit 5 provides [REDACTED] and includes [REDACTED] fragmentation kits 1 and 2, which provide [REDACTED].*

doors of the XM1166 and the M1151 with fragmentation kit 5. Depending on the mission of the vehicle, the rear doors on the XM1166 can be configured to open forward (Figure 4) or to open rearward (Figure 5).

**(U) Figure 4. XM1166
Rear Doors Opening Forward**



**(U) Figure 5. XM1166
Rear Doors Opening Rearward**



(U) A contract to begin work on the XM1166 was awarded in December 2004, and the first vehicle was delivered to the Army in February 2005. In May 2006, the Army contracted the effort to develop a level three technical data package⁵ for the body of the XM1166 and the integration of the body on the ECV chassis. The Government accepted the technical data package in June 2007.

XM1166 Vehicle Acquisition and Fielding (U)

(U) On May 12, 2006, the TACOM Life Cycle Management Command contracted with General Purpose Vehicles for 30 XM1166 bodies to be integrated on the M1151-model HMMWV chassis. The previous day, the Marine Corps Systems Command had approached the Project Manager with approval and funding for the purchase of 10 additional XM1166s. The Army contract was modified in November 2006 to add the purchase of the 10 XM1166s. In May 2008, the Marine Corps sent 9 XM1166s to Iraq and exchanged 225 older HMMWVs from Marine Corps storage for 13 of the Army's 30 XM1166s. As of January 2010, the Marine Corps had brought back the vehicles that were in Iraq and now has 22 XM1166s in storage at the Marine Corps Logistics Command in Albany, Georgia, and 1 vehicle at the Marine Corps Base Quantico, Virginia (for demonstration).

Cessation of Army Acquisition (U)

(U) In April 2007, the Product Manager for Light Tactical Vehicles planned to ship five XM1166s to theater, and in May 2007, the Product Manager approached theater commanders about having soldiers try XM1166s to assess their capabilities. Shipment of the vehicles was contingent on theater acceptance. However, the Product Manager stated that commanders in the field would not accept the XM1166s because the field

⁵ (U) A technical data package for an item defines the required configuration and procedure to ensure adequacy of item performance and consists of all applicable technical data such as drawings, associated lists, specifications, standards, performance requirements, quality assurance provisions, and packaging details. A level three technical data package is adequate for supporting production.

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commanders were concerned the XM1166 would be targeted based on its unique appearance. The Product Manager stated he was able to field fragmentation kit 5⁶ for the M1151 faster and in greater quantities than the XM1166.

(~~FOUO~~) In the summer of 2007, more than 2 years after the XM1166 was unveiled to the Army, the Project Manager stated he decided not to pursue the XM1166 because its protective advantage over the M1151-model HMMWV was diminished to a degree by the integration of fragmentation kit 5. However, the doors in the XM1166 have integrated fragmentation kit 5-level protection, in addition to the XM1166's semimonocoque welded cab, which introduces improved crew survivability against [REDACTED] through significant structural improvements to the crew compartment as compared with the M1151-model HMMWV.*

(U) The Product Manager for Light Tactical Vehicles stated that the Project Manager would not field available XM1166s until a fragmentation kit 6⁷ was developed for the XM1166. In March 2008, the Army began an effort to design a fragmentation kit 6 for the XM1166. The Product Manager stated that the rearward-opening doors (Figure 5) of the XM1166 were a potential solution to a problem with the doors of the M1151 with fragmentation kit 6.⁸ Thus far, the Product Manager stated, TACOM Life Cycle Management Command Industrial Base Operations Directorate has mocked up a fragmentation kit 6 solution for the XM1166. As of January 2010, the Army had 15 unused XM1166s.⁹

XM1166 Test Results (U)

(U) The XM1166 was developed as a risk reduction solution, and underwent expedited testing to support urgent materiel release for urgent fielding. The November 2006 Army Test and Evaluation Command Capabilities and Limitations Report for the XM1166 stated that insufficient XM1166 assets were provided for ballistics testing and that additional IED test events were needed to fully characterize the XM1166's ballistic survivability. Accordingly, a complete analysis of the XM1166 as compared with the M1151 is not possible until all necessary tests are conducted on the XM1166.

⁶ (~~FOUO~~) Objective fragmentation kit 5 provides [REDACTED] The XM1166 has fragmentation kit 1, 2, and 5 levels of protection built in.*

* This paragraph omitted For Official Use Only information.

⁷ (~~FOUO~~) Fragmentation kit 6 provides protection from [REDACTED]

⁸ (U) The March 2007 Army Test and Evaluation Command Capabilities and Limitations Report for the interim fragmentation kit 6 for the M1114 states that entry and exit from the vehicle are hindered by the increased thickness of the doors after the installation of interim fragmentation kit 6. Specifically, when the rear door of the M1114 with interim fragmentation kit 6 is fully open, the rear door armor contacts the front door armor, preventing the front door from being opened.

⁹ (U) The Army procured 30 XM1166s, used 2 as test assets, traded 13 to the Marine Corps, sent 1 to Rock Island Arsenal, Illinois, and stored the remaining 14 at Blue Grass Army Depot, Richmond, Kentucky.

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(S) Although the XM1166 and M1151 with fragmentation kit 5 did not receive all of the same live fire tests, both vehicles were tested against [REDACTED]

The M1151 [REDACTED]

The XM1166 had [REDACTED]

Although this is just one test, the results highlight the potential for increased protection that the XM1166 provides over the M1151 with fragmentation kit 5.*

HMMWV Protection Requirements (U)

(S) The September 2004 HMMWV Operational Requirements Document states that the HMMWV is to provide the crew small-arms protection from multiple hits from [REDACTED] fired at a standoff of [REDACTED] with no perforation. The opaque armor of the M1151A1 with fragmentation kit 5 protects against [REDACTED].

Based on engineering analysis, armored surfaces of the XM1166 are expected to provide protection against [REDACTED]¹⁰ [REDACTED]. A representative from the National Ground Intelligence Center stated that, although testing at [REDACTED]

The Project Manager stated that the use of [REDACTED] a repeatable test parameter. The ballistic tests on the M1151 with fragmentation kit 5 and the XM1166 were not identical. The XM1166 crew compartment met the [REDACTED] requirement for [REDACTED] in the HMMWV Operational Requirements Document. However, the M1151 with fragmentation kit 5 did not meet the [REDACTED]

¹¹* [REDACTED]

(FOUO) A subject matter expert for the Joint Improvised Explosive Device Defeat Organization prepared a briefing on observed threats to vehicle occupants in Operation Iraqi Freedom in September 2006. The Joint Improvised Explosive Device Defeat Organization briefing stated that [REDACTED] can be assumed for typical rifle engagement, and [REDACTED] for medium machine gun engagement. Further, the briefing stated that the enemy demonstrated a [REDACTED].[†] Further, in a large-scale North Atlantic Treaty

* This paragraph omitted classified information.

¹⁰ (U) A ball round is filled with lead and usually has an outer metal jacket. An armor-piercing round has a hard steel core, a small amount of lead on the front and back, and an outer metal jacket. Armor-piercing rounds are more likely to pierce armor than ball rounds.

¹¹ (S) The M1151 with fragmentation kit 5 did meet the [REDACTED] requirement in the HMMWV Operational Requirements Document in the [REDACTED]. The Product Manager for Light Tactical Vehicles added a 1-inch aluminum plate to the C-pillar, and fragmentation kit 7 is designed to provide [REDACTED].[‡]

[†] This paragraph omitted For Official Use Only information.

[‡] This paragraph omitted classified and For Official Use Only information.

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Organization test in which the subjects were not told of the experiment's purpose, [REDACTED] In this context, it is worth noting that the side windows of the XM1166 are about 22 percent thicker than those on the M1151 with fragmentation kit 5 installed. The windshields of the M1151 and the XM1166 are the same thickness.^{12*}

Improvised Explosive Device Test Results (U)

(U) IEDs have caused more than 70 percent of all American combat casualties in Iraq and 50 percent of combat casualties in Afghanistan, both killed and wounded.¹³ Since June 2007, IED attacks in Iraq have decreased; however, the number of effective IED attacks in Afghanistan has increased. Mines and IEDs injure vehicle occupants through vehicle deformation, gross vehicle acceleration, and fragments.

Vehicle Deformation (U)

(U) Vehicle deformation occurs when the blast pressure load imparted to the vehicle structure causes the vehicle structure to rapidly deform. The semimonocoque cab of the XM1166 introduces improved crew survivability through significant structural improvements to the crew compartment over the M1151.

~~(FOUO)~~ The XM1166 crew compartment structure has welded joints, which are superior to the riveted joints on the M1151. The welded joints help prevent the vehicle from collapsing during an [REDACTED] Figure 6 shows the welded B-pillar of the XM1166, and Figure 7 shows the reinforced bolt-on B-pillar of the M1151. Figure 8 shows the complete welded cab of the XM1166.*

(U) Figure 6. Welded B-Pillar of the XM1166



(U) Figure 7. Bolt-on B-Pillar of the M1151



¹² (U) The Product Manager for Light Tactical Vehicles stated that recent improvements in ballistic glass allow for equal protection from thinner panes or increased protection from the same thickness of the glass.

* This paragraph omitted For Official Use Only information.

¹³ (U) From DOD Personnel and Military Casualty Statistics, Defense Manpower Data Center, *Casualty Summary by Reason, October 7, 2001, through August 18, 2007*.

(U) Figure 8. Welded Cab of the XM1166



Gross Vehicle Acceleration (U)

(U) Gross vehicle acceleration occurs when the blast from a mine detonation propels a vehicle upward, sometimes even flipping it over. The large acceleration involved with launching the vehicle and the large deceleration occurring when the vehicle crashes down injure vehicle occupants. Spinal injuries and internal organ rupture are injuries associated with gross vehicle acceleration.

(S) The M1114 had an energy-absorbing support structure under the commander's seat, but it was removed from the M1151 design to meet ground clearance requirements. The Product Manager for Light Tactical Vehicles stated that the commander's seat cushion in the M1151 incorporates a rubber acceleration mitigation device. The Army Test and Evaluation Command found, however, when conducting tests of a [REDACTED]

[REDACTED] M1151 on June 17, 2009, that the [REDACTED] The test [REDACTED]

[REDACTED] However, more than two-thirds of antivehicular landmines weigh more than 13 pounds.¹⁴ The [REDACTED] test was not representative of the typical mine threat.*

(U) The Project Manager stated the acceleration mitigation requirement for all seats is the same and that the commander's seat used in the M1151 passed the mine survivability

¹⁴ (U) An approximation based on information obtained from the Technical Cooperation Program's Conventional Weapons Technology Group, "Protection of Soft-Skinned Vehicle Occupants from Landmine Effects, Technical Report," 2^d edition, September 1999.

* This paragraph omitted classified information.

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requirements established in the 2004 HMMWV Operational Requirements Document in a test on the M1152-model HMMWV.¹⁵ However, the mine test conducted under the front commander's side wheel did not measure for acceleration injuries.

(U) On June 17, 2009, the audit team inspected M1114-, M1151-, and XM1166-model HMMWVs at Marine Corps Base Quantico, Virginia. The team observed that the commander's seat in the M1151 sits directly over the battery box and does not have an energy-absorbing support structure under it, as do the other M1151 seats. In contrast, the team observed that the XM1166 battery box under the commander's seat was designed with an integrated energy-absorbing structure that would still allow the vehicle to maintain the same ground clearance as the M1151.

(U) On August 6, 2009, the audit team also inspected an M1151 at TACOM Life Cycle Management Command. A representative from the Office of the Product Manager for Light Tactical Vehicles stated that an acceleration mitigation device was incorporated into the cushion of the commander's seat, but it was not visible to the audit team. Figure 9 shows the commander's seat of the XM1166 with the integrated energy-absorbing support. Figure 10 shows the commander's seat in the M1151 without an energy-absorbing support structure underneath.

(U) Figure 9. XM1166 Commander's Seat With an Energy-Absorbing Support



¹⁵ (U) The M1152-model HMMWV is a two-door version of the M1151.

(U) Figure 10. M1151 Commander's Seat Without an Energy-Absorbing Support



~~(FOUO)~~ The energy-absorbing support structure under the XM1166 commander's seat cannot be used in the M1151-model HMMWV. The increased rigidity provided by the welded seams and thicker floor panel of the XM1166 provide the structural integrity for the integrated energy-absorbing support structure on the battery box to operate against acceleration forces from [REDACTED]. The M1151's riveted cab and thinner floor do not provide the type of structural integrity required to install the XM1166-type of integrated energy-absorbing support under the commander's seat.^{16*}

Fragments (U)

(U) Fragments of widely varying mass, energy, and lethality are generated from mines and IEDs. Fragments of the casing of a mine or IED are termed primary fragments. Portions of the vehicle that are broken loose by the blast and propelled with sufficient velocity to be hazardous are termed secondary fragments. The degree of hazard posed by a penetrating fragment depends on the location of the impact; any fragment that can penetrate skin is considered to be a significant hazard.

~~(S)~~ Armor characteristics to protect against vehicle fragmentation include:

- The opaque door armor of both the XM1166 and M1151 defeats [REDACTED]
- The XM1166 has a 1-inch-thick aluminum underbody panel, whereas the M1151 has only a ¼-inch-thick aluminum underbody panel.

¹⁶ (U) The Project Manager noted that the M1151 cab structure provides the rigidity required for all seat locations for the components and hardware used on the vehicle.

* This paragraph omitted For Official Use Only information.

† This paragraph omitted classified information.

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- The door windows on the XM1166 are 89 millimeters thick, whereas the windows on the M1151 with fragmentation kit 5 are only 73 millimeters thick.
- The semimonocoque cab of the XM1166 needs fewer bolts and rivets to assemble the vehicle and therefore, may cause less secondary fragments in the event of a [REDACTED] *

Recapitalization of the HMMWV (U)

(U) The Army Deputy Chief of Staff (G-8), in the October 30, 2009, Army Tactical Wheeled Vehicle Investment Strategy, recommended scheduling the end of the procurement of legacy light tactical vehicles and switching the procurement focus to additional Joint Light Tactical Vehicle production;¹⁷ modernizing the M1114-, M1151-, M1152-, M1165-, and M1167-model HMMWVs through recapitalization when feasible; and using the complete industrial base, including depot repair facilities and the original equipment manufacturer, for modernization. A representative of the Army Deputy Chief of Staff (G-8) stated that the XM1166 was not considered in the Army Tactical Wheeled Vehicle Investment Strategy because the Army Deputy Chief of Staff (G-8) was unaware of the vehicle's existence.

Project Manager Actions (U)

(FOUO) The Project Manager had not assessed the feasibility of recapitalizing other HMMWV models to the XM1166 configuration to gain greater protection against [REDACTED]. A representative from Red River Army Depot in Texarkana, Texas,¹⁸ stated that recapitalizing current HMMWVs to the XM1166 model was an excellent proposition because the Government owns a level three technical data package for the XM1166.*

Marine Corps Actions (U)

(U) The Marine Corps Systems Command received positive feedback from Marines in Iraq on the performance of the XM1166. In June 2009, the Marine Corps Systems Command requested and received the XM1166 technical data package from the Product Manager for Light Tactical Vehicles. A Marine Corps Systems Command representative forwarded the XM1166 technical data package to the Albany Maintenance Center, under the Marine Corps Logistics Command, for a determination of the feasibility of recapitalizing Marine Corps M1114- and M1151-model HMMWVs to the XM1166 configuration. The Marine Corps Systems Command representative stated that one of the XM1166 vehicles from Camp Lejeune arrived at the Albany Maintenance Center the week of June 15, 2009, for the feasibility study. Personnel at the Albany Maintenance Center determined they could build the XM1166.

* This paragraph omitted For Official Use Only information.

¹⁷ (U) The Product Manager for Light Tactical Wheeled Vehicles, in a November 16, 2009, brief on the HMMWV fleet recapitalization program, stated that HMMWV production will end in 2012.

¹⁸ (U) Red River Army Depot maintains ground combat and tactical systems.

Conclusion (U)

~~(FOUO)~~ Our review of available test reports showed indications that the design of the XM1166 offered advantages over the M1151-model HMMWV.

- The XM1166 crew compartment structure, which features welded joints instead of the riveted joints of the M1151, helps prevent the vehicle from collapsing during [REDACTED].*
- Compared with the M1151, the XM1166 has a thicker, welded underbody panel, which provides the warfighter increased protection from injury caused by [REDACTED].*
- Unlike the M1151,¹⁹ the XM1166 has an integrated, energy-absorbing support structure on the battery box under the commander's seat that reduces the effects of gross vehicle acceleration from [REDACTED].*
- Compared with the M1151, the XM1166 has thicker transparent door armor than the M1151, a feature that may help prevent injury to vehicle occupants from [REDACTED].*
- The XM1166 weighs 528 pounds less than the currently fielded M1151 with fragmentation kit 5 installed.
- Like the M1151, the XM1166 is built on an ECV chassis.

~~(FOUO)~~ IEDs are a major cause of death and injury in Iraq and Afghanistan. With the semimonocoque cab of the XM1166, recapitalized HMMWVs may provide increased protection from [REDACTED]. Accordingly, the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) should direct the continuation of live fire testing on the XM1166 and on any other HMMWV recapitalization configuration under consideration to determine the vehicle's capabilities compared with those of the M1151 with fragmentation kit 5. If the results of the testing support the conclusions of testing already completed, the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) should determine the feasibility of recapitalizing current HMMWV variants to incorporate the semimonocoque design of the XM1166. By not pursuing the potential advantages of the XM1166 design, the Project Manager is missing an opportunity to potentially enhance capabilities of the HMMWV family of vehicles. In addition, as discussed in the Background, the HMMWV has been reclassified as an ACAT IC program and meets the definition of a covered system for live fire testing. Accordingly, the Director, Operational Test and Evaluation, now has acknowledged, in response to the draft report, responsibility for overseeing the conduct of live fire testing for all HMMWV configurations that the Army is considering for its HMMWV recapitalization program.*

* This paragraph omitted For Official Use Only information.

¹⁹ ~~(S)~~ As noted earlier the report, the Product Manager for Light Tactical Vehicles stated that the commander's seat cushion in the M1151 contains a rubber acceleration mitigation device. However, an Army Test and Evaluation Command test report [REDACTED].*

Management Comments on the Finding, and Our Response (U)

(U) A summary of management comments on the finding and our response are in Appendix D.

Recommendations, Management Comments, and Our Response (U)

Revised Recommendations (U)

~~(FOUO)~~ The HMMWV program has crossed the threshold for an ACAT I program and meets the definition of a covered system for live fire testing. The HMMWV recapitalization program provides the opportunity to [REDACTED]. Accordingly, we revised Recommendation A.1.a to conduct live fire tests on all recapitalized HMMWV configurations in accordance with the M1151 test plan to ensure that the test results of the recapitalized HMMWV configurations and the M1151 are comparable. We also revised Recommendation A.2 to ensure that all recapitalized HMMWV configurations are on the Office of the Secretary of Defense Test and Evaluation Oversight List for live fire test and evaluation oversight.*

(U) A.1. We recommend that the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) direct the Program Executive Officer for Combat Support and Combat Service Support to:

(U) a. Continue live fire tests on the XM1166 and on any other High Mobility Multi-Purpose Wheeled Vehicle recapitalization configurations under consideration in accordance with the M1151 test plan to ensure the test results of the recapitalized High Mobility Multi-Purpose Wheeled Vehicle and M1151 are comparable.

~~(FOUO)~~ **b. Determine the feasibility of recapitalizing High Mobility Multi-Purpose Wheeled Vehicles currently in use to the XM1166, or similar, configuration to gain greater protection for soldiers against [REDACTED]**

~~(FOUO)~~ **c. If it is determined feasible, recapitalize current High Mobility Multi-Purpose Wheeled Vehicles to the XM1166, or similar, configuration to gain greater protection for soldiers against [REDACTED]**

* This paragraph omitted For Official Use Only information.

Department of the Army Comments (U)

(U) The Deputy for Acquisition and Systems Management, Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) disagreed with the recommendations. He stated that the HMMWV has completed DOD live fire test requirements in accordance with the Office of the Secretary of Defense's Live Fire Test and Evaluation. He also stated that the Army has not laid out a requirement that would establish a need to recapitalize the HMMWV fleet to the XM1166 or a similar capability. Further, he stated that HMMWVs are not being recapped to defeat threats identified in Iraq and Afghanistan and that the XM1166 does not meet the September 2004 HMMWV operational requirements.

Our Response (U)

(U) The Army comments were not responsive. The Deputy for Acquisition and Systems Management's statement that the HMMWV has completed live fire test requirements did not acknowledge that the XM1166, unlike the M1151-model HMMWV configuration, has a welded cab. Accordingly, the Army cannot use live fire tests completed on the riveted M1151 with fragmentation kit 5 to evaluate of the survivability of the solid welded structure of the XM1166. To ensure that the DOD provides the warfighter with the most survivable HMMWV, the Army needs to complete live fire tests on the XM1166 and on any other HMMWV recapitalization configurations under consideration in accordance with the M1151 test plan to ensure that the test results of the recapitalized HMMWV design and the M1151 with fragmentation kit 5 are comparable, even though the M1151 test plan does not represent the realistic landmine threat.²⁰ Completing this testing will allow decisionmakers to determine the best, most survivable HMMWV configuration for recapitalization.

~~(FOUO)~~ Although the Deputy for Acquisition and Systems Management asserted that HMMWVs are not being recapitalized to defeat threats identified in Iraq and Afghanistan, the Product Manager for Light Tactical Wheeled Vehicles, in a November 16, 2009, brief on the HMMWV fleet recapitalization program, stated that the Project Manager is currently exploring HMMWV recapitalization solutions to improve survivability and automotive performance and to reduce operation and sustainment costs. The brief stated that the crew compartment of the HMMWV must be a solid structure and that an "armored beer can" does not have the strength or structure to withstand blast and fragment loads. The brief identified the need to recapitalize the HMMWV fleet to [REDACTED] The Product Manager is considering these improvements in response to the [REDACTED] to HMMWVs identified during Operations Iraqi Freedom and Enduring Freedom.* However, the XM1166, which has a

²⁰ (U) We plan to evaluate the adequacy and oversight of HMMWV live fire testing in a second report.

* This paragraph omitted For Official Use Only information.

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welded cab structure as opposed to the riveted structure of the M1151, was inexplicably ignored in the brief as a HMMWV configuration under consideration for the HMMWV fleet recapitalization program.

~~(FOUO)~~ We agree with the Deputy for Acquisition and Systems Management's statement that the XM1166, configured with doors that provide a fragmentation kit 5-level of protection, does not meet the requirements in the September 2004 HMMWV Operational Requirements Document, but neither does the M1151 with fragmentation kit 5. Further, the Army spent about \$58 million on the development and testing of the ECV2 and planned to spend an additional \$3.84 billion on the acquisition of the ECV2, which also would not have met the requirements in the September 2004 HMMWV Operational Requirements Document. In reference to the November 16, 2009, brief on the HMMWV fleet recapitalization program, the Product Manager stated that some requirements in the September 2004 HMMWV Operational Requirements Document would not be met because of [REDACTED]. The brief states that [REDACTED]. As evidenced in the finding, the XM1166 provides enhanced survivability against [REDACTED] compared with the M1151 with fragmentation kit 5 and therefore should not be ignored but considered as a candidate for the planned HMMWV recapitalization program as recommended.*

~~(FOUO)~~ IEDs continue to be the number one threat to U.S. troops in Iraq and Afghanistan. There is widespread consensus that this threat will not go away and that IEDs will continue to be a weapon of strategic influence in future conflicts. DOD clearly has a need for improved protection against IEDs based on the recent requirements for the Mine Resistant Ambush Protected Vehicle, the Mine Resistant Ambush Protected-All Terrain Vehicle (M-ATV), and the JLTV. However, in today's fiscal environment, DOD may not be able to afford to replace all HMMWVs with these improved vehicles. The Army needs to prepare for the possibility that HMMWVs will be a part of the light tactical wheeled vehicle fleet for the next 20 to 30 years. The HMMWV recapitalization program provides the opportunity to [REDACTED]. Based on the design features of the XM1166, it should be provided due consideration to meet HMMWV recapitalization requirements in an effort to provide enhanced protection to users in Southwest Asia.*

(U) Accordingly, we request that the Assistant Secretary of the Army (Acquisition, Logistics, and Technology), reconsider the position taken by the Deputy for Acquisition and Systems Management and respond to Recommendations A.1.a, A.1.b, and A.1.c in response to the final report.

* This paragraph omitted For Official Use Only information.

Director, Operational Test and Evaluation, Comments (U)

(U) Although not required to comment, the Director, Operational Test and Evaluation, stated that he will require adequate live fire and operational tests to determine the effectiveness, suitability, and survivability of the XM1166 in the event the Army decides to recapitalize the current HMMWV fleet. He also stated that this potential XM1166 test program would verify our assumption that the semimonocoque hull provides increased crew protection compared with the M1151-model HMMWV. Finally, the Director stated that it was not apparent from his review of the XM1166 data that the semimonocoque hull alone provides increased crew protection.

Our Response (U)

(U) We believe the Director misinterpreted the description of the configuration of the XM1166 when he stated that it was not apparent that the XM1166's semimonocoque hull alone provides increased crew protection. As stated in the finding, the XM1166 incorporates several design features in addition to the semimonocoque hull that work together as a system to increase crew survivability: a thicker, welded underbody panel; an integrated energy-absorbing support structure underneath the commander's seat; and thicker transparent door armor. Our review of the XM1166 test data shows the potential advantages of the vehicle's design over that of the currently fielded M1151-model HMMWV with fragmentation kit 5.

(U) A.2. We recommend that the Director, Operational Test and Evaluation, add all recapitalized High Mobility Multi-Purpose Wheeled Vehicle configurations to the Office of the Secretary of Defense Test and Evaluation Oversight List for live fire test and evaluation oversight.

Director, Operational Test and Evaluation, Comments (U)

(U) The Director, Operational Test and Evaluation, agreed with the recommendation, stating that because the HMMWV Armor program, which includes the XM1166, has been on the Office of the Secretary of Defense Test and Evaluation Oversight List for live fire test and evaluation since 2006, adding the XM1166 as a separate program on the Test and Evaluation Oversight List was unnecessary.

Department of the Army Comments (U)

(U) Although not required to comment, the Deputy for Acquisition and Systems Management, Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) stated that the HMMWV is already on the Test and Evaluation Oversight List.

Our Response (U)

(U) The comments of the Director, Operational Test and Evaluation, were responsive and met the intent of the recommendation. The Army Test and Evaluation Command began live fire testing on the XM1166 in December 2005, before the HMMWV Armor Program's addition to the Office of the Secretary of Defense Test and Evaluation

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Oversight List for live fire test and evaluation. While the Deputy's comment on the HMMWV Program is accurate, we wanted to ensure that his office was aware of the vehicle's existence and the requirement for the Army to conduct live fire testing on HMMWV configurations under consideration for the HMMWV recapitalization program.

(U) To ensure DOD provides the warfighter with the most survivable HMMWV, the Army needs to continue live fire tests on the XM1166 and on any other HMMWV recapitalization configurations under consideration in accordance with the M1151 test plan to ensure the test results of the recapitalized HMMWV design and the M1151 with fragmentation kit 5 are comparable. This testing will allow decisionmakers to determine the best, most survivable HMMWV configuration for recapitalization.

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B. Army Management of the Next Generation Expanded Capacity Vehicle Acquisition (U)

(U) The Project Manager for Tactical Vehicles (Project Manager) planned to acquire the Next Generation Expanded Capacity Vehicle (ECV2) to replace some of the current Expanded Capacity Vehicle (ECV)-model HMMWVs without first:

- establishing the ECV2 Program as a new start acquisition program,
- planning to conduct full and open competition, or
- determining through the Joint Capabilities Integration and Development System process whether the ECV2 Program will provide capabilities offered by other current and projected tactical wheeled vehicles.

(U) The Project Manager bypassed acquisition requirements in the DOD 5000 series of directives and the Federal Acquisition Regulation (FAR) because he did not consider AM General's unsolicited ECV2 proposal as a new acquisition program but as a part of a \$10.1 billion proposed sole-source production contract for the ECV-model HMMWV. As a result, the Project Manager did not plan to afford the Under Secretary of Defense for Acquisition, Technology, and Logistics the opportunity or information to make an informed decision on the need to procure 11,500 ECV2s for \$3.84 billion. The ECV2 would duplicate the capabilities of, or not be as capable as, other tactical vehicles being acquired, such as the Mine Resistant Ambush Protected-All-Terrain Vehicle (M-ATV) and the Joint Light Tactical Vehicle (JLTV). Also, the ECV2 would have the same survivability limitations as the HMMWVs, including a flat bottom and multipiece cab, which do not provide warfighters with optimal protection against the current landmine and IED threat.

(U) After our discussions with all levels of Army acquisition management, the Project Manager deferred the acquisition of the ECV2 in May 2009, and put the \$3.84 billion in funding to better use for FY 2010 through FY 2013.

Regulations and Instructions Regarding Acquisition (U)

(U) The Chairman of the Joint Chiefs of Staff has issued guidance regarding the Joint Capabilities Integration and Development System. Also, DOD and the Army have issued guidance regarding the treatment of system modifications and upgrades as acquisition programs. Further, the FAR contains requirements for obtaining full and open competition in Defense procurements.

Chairman of the Joint Chiefs of Staff Instruction (U)

(U) Chairman of the Joint Chiefs of Staff Instruction 3170.01G, "Joint Capabilities Integration and Development System," March 1, 2009, states that the Joint Capabilities Integration and Development System was created to support the statutory requirements of

the Joint Requirements Oversight Council to validate and prioritize joint warfighting requirements. The primary objective of the process is to ensure warfighters receive the capabilities required to successfully execute the missions assigned to them.²¹

Department of Defense Instruction (U)

(U) DOD Instruction 5000.02, "Operation of the Defense Acquisition System," December 2, 2008, states that block upgrades, planned product improvements, and similar efforts that provide a significant increase in operational capability and meet an acquisition category program threshold should be managed as separate increments. The Instruction requires each increment in an acquisition to be initiated at Milestone B,²² the engineering and manufacturing development milestone decision, and the milestone decision to be supported by acquisition documentation, such as an acquisition program baseline and an acquisition strategy.²³

Army Regulation and Pamphlet (U)

(U) Army Regulation 70-1, "Army Acquisition Policy," December 31, 2003, identifies core management issues that must be addressed before making program decisions. These include determining what the program costs, whether a program is affordable, and whether a program is fully funded.

(U) Department of the Army Pamphlet 73-1, "Test and Evaluation in Support of Systems Acquisition," May 30, 2003, states that any modification that is of sufficient cost and complexity to qualify as a major Defense acquisition program (ACAT I) will be considered for management purposes as a separate acquisition effort.

Federal Acquisition Regulation (U)

(U) The FAR requires agencies to perform acquisition planning and conduct market research to promote full and open competition. Acquisition planning should take place well in advance of the fiscal year in which the contract award is necessary. If an agency decides not to pursue full and open competition, agency officials must cite and justify one of the exceptions to full and open competition provided by the FAR. See Appendix B for a list of the competitive procedures available for use in fulfilling the requirement for full and open competition.

²¹ (U) These requirements were also contained in Chairman of the Joint Chiefs of Staff Instruction 3170.01F which is the previous version of this instruction.

²² (U) Each increment should have its own Milestone B unless the milestone decision authority decides the increment will be initiated at Milestone C.

²³ (U) These requirements were also contained in the May 12, 2003, version of DOD Instruction 5000.2.

Development and Planned Acquisition of the Next Generation Expanded Capacity Vehicle (U)

(U) AM General began developing the ECV2 in March 2005. AM General first publicly displayed the ECV2 at an Association of the United States Army exposition in early 2006. AM General developed the ECV2 while working to improve ECV-model HMMWV subcomponents including the frame, suspension, brakes, and cooling system because of the degradation in performance from the weight of add-on armor. Many of those improvements were included in the upgrade to the ECV-model HMMWV called the Reliability Enhanced Vehicle, which the Army began procuring in April 2008. AM General designed the ECV2 to make further upgrades to the Reliability Enhanced Vehicle, such as reinforcing the body of the vehicle, raising the roof, lengthening the vehicle compartment for more passenger leg room, and leveling the floor for easier egress. The AM General design of the ECV2 provided occupant protection equivalent to that offered by the currently fielded M1151A1-model HMMWV with fragmentation kit 5 installed. However, warfighters determined that this level of protection was inadequate during Operations Iraqi Freedom and Enduring Freedom, leading them to request Mine Resistant Ambush Protected-type vehicles.

Acquisition Plan (U)

(U) The Program Executive Officer for Combat Support and Combat Service Support (Program Executive Officer) approved the HMMWV Acquisition Plan on September 9, 2008. The Acquisition Plan included the Army's proposed approach for the procurement of both the ECV-model HMMWV and the ECV2. The Program Executive Officer anticipated making an initial contract award for ECV models in May 2009 and using a contract modification to begin ECV2 production in June 2009. The Acquisition Plan also stated that the ECV2 was the final evolution of the HMMWV and restored an appropriate balance among payload, protection, and performance. The Acquisition Plan did not state how many ECV2s the Army intended to procure.

Development Cost and Funding (U)

(U) Representatives from AM General advised the audit team that they took the initiative to develop the ECV2 as a long-term solution to the problem of HMMWVs being overloaded with armor in Iraq and Afghanistan. Through April 2009, a representative from AM General stated that the company spent approximately \$75 million developing the ECV2. The representative estimated that the total development cost would be approximately \$100 million. A significant portion of the ECV2 development cost was funded through indirect costs for which AM General was reimbursed on Army contracts. Specifically, in February 2007, a Defense Contract Audit Agency report on AM General's FY 2007 independent research and development (IR&D) expenditures, part of the company's general and administrative expenses rate billed to the Government, showed significant spending for the ECV2 and JLTV Programs. The ECV2 and JLTV Programs accounted for \$47 million or 67 percent of AM General's total IR&D costs to the Government. According to the Defense Contract Audit Agency report, AM General is authorized to amortize general and administrative expenses across its customers'

contracts. The U.S. Government is the primary AM General customer, procuring about 97 percent of AM General's vehicles. Army budget documents for FY 2010 submitted in May 2009 included no funding for the ECV2 Program.²⁴

Defense Acquisition System Requirements (U)

(U) The HMMWV draft Justification Review Document for Other than Full and Open Competition stated that the Army planned to procure 11,500 ECV2s. According to the 2008 HMMWV Life Cycle Cost Estimate, the Army planned to spend about \$3.84 billion on the ECV2 procurement, or about \$334,000 per vehicle, which exceeds the dollar threshold for an ACAT I program.²⁵ Army Pamphlet 73-1 requires that any modification of sufficient cost and complexity to qualify as an ACAT I program be considered for management purposes as a separate acquisition effort. Accordingly, the Project Manager should have established and planned to manage the ECV2 Program as a separate acquisition effort and not as a part of the existing ECV-model HMMWV Program. By not managing it as a separate acquisition effort, the Project Manager did not give the Under Secretary of Defense for Acquisition, Technology, and Logistics the full knowledge and appropriate oversight of the ECV2 Program. During the audit, on March 9, 2009, the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) issued an acquisition decision memorandum that required the Project Manager and the Program Executive Officer to submit a formal request to the Under Secretary of Defense for Acquisition, Technology, and Logistics for the appropriate ACAT designation for the ECV2 family of vehicles.

(U) The Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics uses program documentation required for an ACAT I program for performing program oversight and as an internal control tool to ensure that approved capability needs are translated into well-managed acquisition programs. Appendix C shows where the Project Manager did not meet the intent of acquisition requirements in DOD acquisition regulations when planning the ECV2 procurement.

Federal Business Opportunities Notice (U)

(U) The TACOM Life Cycle Management Command representatives, in their draft Justification Review Document for Other than Full and Open Competition for HMMWV Production, stated that the ECV2 test vehicle procurement, as well as its associated test support contract, were synopsized on the Federal Business Opportunities Web site in September 2007.²⁶ The Federal Business Opportunities Notice stated that the

²⁴ (U) Army budget documents for FY 2009 submitted in February 2008 stated that the Army planned to procure a mixture of ECV2 variants in FY 2009 but did not state the quantity.

²⁵ (U) DOD Instruction 5000.02 states that the dollar threshold for an ACAT I program is \$2.19 billion in FY 2000 constant dollars. Projected procurement costs for the ECV2 in FY 2000 constant dollars are about \$3.26 billion.

²⁶ (U) Although the draft Justification Review Document states that the notice was posted in November 2007, it was initially posted in September 2007 and was then updated in November to increase the number of test vehicles to be purchased.

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Government intended to complete the ECV2 procurement through other than full and open competition and allowed firms to make their interest and ability to respond to the effort known. However, the Notice did not mention the Project Manager's plan to purchase thousands of ECV2s. It merely mentioned the Project Manager's intent to procure 15 test vehicles from AM General and, if test results were successful, to procure future production vehicles on a sole-source basis.

Competition (U)

(U) The draft Justification Review Document for Other than Full and Open Competition stated that AM General was:

the only known, responsible source possessing the requisite knowledge, facilities, tooling and expertise to manufacture the HMMWV for this additional requirement quantity within the timeframe that meets customers' needs.

(U) In January 2009, the Office of the Deputy Assistant Secretary of the Army (Procurement and Policy) returned the draft Justification Review Document to the TACOM Life Cycle Management Command representatives and directed that two separate Justification Review Documents be completed: one document to justify the sole-source ECV-model procurement and a second document to justify the sole-source ECV2 procurement. A representative from the Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) stated that the draft Justification Review Document was returned because the Office of the Assistant Secretary questioned the size of the proposed ECV-model procurement because the HMMWV program was scheduled to end in 2012. In addition, the representative stated that he did not believe there was support for a sole-source procurement of ECV2s because of part differences between the ECV-model HMMWV and the ECV2. The TACOM Life Cycle Management Command representatives did not submit the two separate justifications to the Office of the Deputy Assistant Secretary of the Army (Procurement and Policy) for review before the planned procurement was stopped.

(U) Obtaining full and open competition in contracting is a major tenet of the FAR. Specifically, the FAR states that all agencies should perform acquisition planning and conduct market research for all acquisitions to promote and provide for full and open competition. The FAR lists several competitive procedures that are available for use in fulfilling the requirement for full and open competition, and none of those procedures were used by the Project Manager in his efforts to procure the ECV2.

(U) The JLTV is being developed by the Army and the Marine Corps as the future light tactical vehicle to replace a portion of the HMMWV fleet. Fourteen manufacturers have expressed interest in the JLTV Program. Although the JLTV has different requirements than the ECV2, we have no reason to believe that one or more of those manufacturers

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could not produce an ECV2-type vehicle. By not fulfilling mandatory competition requirements, the Project Manager did not have information necessary to ensure that he was buying the best vehicle to meet user requirements for the best price.

Vehicle Platform Commonality (U)

(U) Although the Project Manager maintained that the ECV2 was part of the HMMWV family of vehicles, the ECV2 had less than 30 percent of parts in common with the ECV-model HMMWV and would be built on a separate production line.²⁷ The September 2007 Federal Business Opportunities Notice stated that there was no requirement to use the current ECV chassis or to have the same parts as the current HMMWV models. Based on those facts, we question how the Project Manager could consider the ECV2 part of the HMMWV family of vehicles. If in the future the ECV2 is procured, the Project Manager should pursue the ECV2 as a new start acquisition program and submit acquisition documentation to designated acquisition officials as mandated by DOD and Army regulations.

Other Tactical Wheeled Vehicle Solutions (U)

(U) Army and Marine Corps officials are currently pursuing multiple options to help mitigate the mine and IED problem in Iraq and Afghanistan, including procuring the M-ATV and developing the JLTV.

(U) A representative from the Joint Staff (J-8) stated that combatant commanders are dissatisfied with the force protection provided by the HMMWV variants in theater. Consequently, combatant commanders have submitted formal requests for more capable and better protected vehicles. The representative also stated that the combatant commanders' request for the M-ATV included protection requirements over and above those provided by the ECV2.

(U) In addition, Army and Marine Corps officials are jointly developing the JLTV as the successor to the HMMWV. The JLTV is currently intended to replace a large portion of the HMMWV fleet. The Army and Marine Corps plan to schedule an engineering and manufacturing development milestone decision for the JLTV Program in FY 2011 and to issue the production contract in FY 2013. Accordingly, in response to combatant commanders' requests for vehicles with a higher level of protection, the Department is planning to procure the M-ATV and the JLTV.

Tactical Wheeled Vehicle Strategy (U)

(U) On October 30, 2009, the Army Deputy Chief of Staff (G-8) approved the Army Tactical Wheeled Vehicle Investment Strategy. The Strategy is designed to provide specific fleet investment guidance and serve as the basis for procurement and sustainment

²⁷ (U) Although the ECV2 and ECV-model HMMWV would be built on separate production lines, they would share some parts of the line.

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processes. It is the document on which all fleet investment, integration, and management decisions will be based unless superseded by updates from the Department of the Army. With regard to the ECV2, the Strategy specifically states that:

the Army will not procure the ECV2 because current analysis of the vehicle offered by AM General shows that the vehicle will have inadequate underbody IED protection and only 30 percent commonality with the current HMMWV fleet.

(U) In addition, a representative from the Office of the Army Deputy Chief of Staff (G-8) stated that the Office of the Army Deputy Chief of Staff (G-3/5/7) is in the process of finalizing a joint Army and Marine Corps tactical wheeled vehicle strategy that will be the guiding document for all tactical wheeled vehicle strategies and plans.

(U) As previously discussed, the Program Executive Officer anticipated using a contract modification to begin ECV2 production in June 2009, 4 months before the approval of G-8's Tactical Wheeled Vehicle Investment Strategy and before a joint Army and Marine Corps strategy was complete. Accordingly, the Program Executive Officer should not have been planning to conduct the ECV2 procurement before obtaining a complete, definitive plan outlining how all light tactical vehicles combine into an efficient fleet mix for the DOD and how the ECV2 would contribute to that mix, given that it was not as capable as other vehicles being acquired. Similarly, the Army needs to complete the Joint Capabilities Integration and Development System process before making decisions to acquire future light tactical vehicles.

Management Actions (U)

(U) During the audit, the Project Manager decided to bring the ECV2 Program to a "logical conclusion" because the Office of the Army Deputy Chief of Staff (G-8) decided not to invest in the ECV2. According to a representative from the Office of the Project Manager for Tactical Vehicles, bringing the ECV2 Program to a "logical conclusion" means tying up loose ends to ensure that as little testing effort as possible is wasted, and that the ECV2 Program can be efficiently restarted if necessary. By not procuring the ECV2, the Army can put \$3.84 billion in Other Procurement, Army funding to better use in FY 2010 through FY 2013. According to the Program Executive Office for Combat Support and Combat Service Support, those funds will remain in the HMMWV budget line.

~~(FOUO)~~ Despite the Project Manager's assertions that the ECV2 Program had ended, the Product Manager for Light Tactical Vehicles, in a briefing dated November 17, 2009, stated that he was considering [REDACTED]

* This action seems to be in direct conflict

* This paragraph omitted For Official Use Only information.

with the recommendation by the Army Deputy Chief of Staff (G-8) to not procure the ECV2 and the finding evidence that the ECV2 is not as capable as other vehicles being acquired.

Conclusion (U)

(U) The Project Manager planned to acquire 11,500 ECV2s at an estimated cost of \$3.84 billion without first establishing the ECV2 Program as a new start acquisition program, planning to conduct full and open competition, or determining through the Joint Capabilities Integration and Development System process whether other current and planned light tactical wheeled vehicles provide capabilities planned for the ECV2 Program. In doing so, the Project Manager risked procuring a vehicle that duplicated existing capabilities and had vulnerabilities that vehicles such as the M-ATV are being procured to mitigate.

(U) After our discussions with all levels of Army acquisition management, the Project Manager deferred the acquisition of the ECV2 in May 2009 and put the funding to better use. The Project Manager should not restart the ECV2 Program until the Joint Capabilities Integration and Development System process is completed, including an analysis of ECV2 capabilities compared with those of other tactical wheeled vehicles. If the Joint Capabilities Integration and Development System process determines that acquisition of the ECV2 is justified, the Project Manager needs to comply with full and open competition requirements. Further, the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) would have to designate the ECV2 as a new start acquisition program and assign the appropriate acquisition category related to the funding thresholds for the planned program.

Management Comments on the Finding, and Our Response (U)

(U) A summary of management comments on the finding and our response are in Appendix D.

Recommendations, Management Comments, and Our Response (U)

(U) **B.1. We recommend that the Assistant Secretary of the Army (Acquisition, Logistics, and Technology), in coordination with the Commanding General, U.S. Army Training and Doctrine Command, perform an analysis of the capabilities of the High Mobility Multi-Purpose Wheeled Vehicle, Next Generation Expanded Capacity Vehicle, Mine Resistant Ambush Protected Vehicle, Mine Resistant Ambush Protected-All-Terrain Vehicle, and Joint Light Tactical Vehicle as part of the Joint Capabilities Integration and Development System process to determine the need for the Next Generation Expanded Capacity Vehicle before authorizing any future funding for the development, testing, and acquisition of Next Generation Expanded Capacity Vehicles.**

Department of the Army Comments (U)

(U) The Deputy for Acquisition and Systems Management, Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) disagreed because the Army has decided to take no further action on the ECV2. He stated, that should the Army revisit the ECV2, the recommendation will be taken under consideration in the acquisition planning.

(U) The Commanding General, U.S. Army Training and Doctrine Command, agreed but requested that the recommendation be revised to state that the Assistant Secretary of the Army (Acquisition, Logistics, and Technology), in coordination with the Commanding General, U.S. Army Training and Doctrine Command, should continue to develop requirements for the next generation of light tactical vehicles using the Joint Capabilities Integration and Development System process. The Commanding General explained that the U.S. Army Training and Doctrine Command does not determine needs. Needs are defined in the Initial Capabilities Document and in the Capability Development Document, which are approved by the Requirements Oversight Councils. Finally, the Commanding General stated that the JLTV program is a direct result of the Joint Capabilities Integration and Development System process and that an analysis of alternatives for the JLTV program is ongoing in support of an engineering and manufacturing development milestone decision planned for fourth quarter FY 2011.

Our Response (U)

(U) Although the Deputy for Acquisition and Systems Management disagreed with the recommendation, his response met the intent of the recommendation because the recommendation will be taken under consideration in acquisition planning should the Army revisit the ECV2 in the future. If the Army does revisit the ECV2 in the future, it is critical that the Army conduct an analysis of the capabilities of current and future tactical wheeled vehicles before investing any future funding in an ECV2-type vehicle.

(U) Although the Commanding General's comments were responsive, we did not make his suggested revision to the recommendation. For the ECV2 Program, the Project Manager planned to procure 11,500 ECV2s at an estimated cost of \$3.84 billion without the approval of the Joint Requirements Oversight Council. Implementing the recommendation as written will ensure that the Joint Capabilities Integration and Development System weighs the relative capabilities of all these tactical wheeled vehicles before authorizing acquisition of ECV2s.

(U) B.2. We recommend that the Assistant Secretary of the Army (Acquisition, Logistics, and Technology):

(U) a. Designate the Next Generation Expanded Capacity Vehicle Program as a new start and, if appropriate, a major Defense acquisition program if the analysis completed by the U.S. Army Training and Doctrine Command

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as part of the Joint Capabilities Integration and Development System process determines that the acquisition of Next Generation Expanded Capacity Vehicles is justified.

(U) b. Direct the Program Executive Officer for Combat Support and Combat Service Support to pursue full and open competition in the acquisition of Next Generation Expanded Capacity Vehicles if subsequent procurement of such vehicles is justified.

Department of the Army Comments (U)

(U) The Deputy for Acquisition and Systems Management, Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) disagreed, stating that the Army has decided to take no further action on the ECV2. He stated that, should the Army revisit the ECV2, the recommendation will be taken under consideration in the acquisition planning.

Our Response (U)

(U) Although the Deputy for Acquisition and Systems Management disagreed with the recommendations, his response met their intent as the Army will take the recommendations under consideration in acquisition planning should it revisit the ECV2. Should the Army revisit the ECV2 Program in the future, it is essential that the ACAT level of any future ECV2 procurement be properly identified at the outset to ensure it moves smoothly through the acquisition process with the appropriate level of oversight. In addition, it is vitally important that full and open competition be pursued for any future procurement of ECV2-type vehicles to ensure that the best vehicle will be procured for the warfighter at the best value to the taxpayer.

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Appendix A. Scope and Methodology (U)

(U) We conducted this performance audit from October 2008 through January 2010 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

(U) The objective of the audit was to determine whether the Army effectively managed efforts to develop, test, and acquire armor solutions for light tactical wheeled vehicles. To accomplish this objective, we reviewed DOD and Army acquisition processes to determine whether the Army effectively managed efforts to develop, test, and acquire the Risk Reduction Vehicle (XM1166) and the Next Generation Expanded Capacity Vehicle (ECV2). We plan to address the adequacy and oversight of HMMWV live fire testing in a second report.

(U) We reviewed documentation and information dated from July 1980 through November 2009. Documents reviewed included the following:

- Joint Mission Element Need Statement for the High Mobility Multi-Purpose Wheeled Vehicle, July 8, 1980
- Operational Requirements Document for the High Mobility Multi-Purpose Wheeled Vehicle, September 17, 2004
- Safety Confirmation for the XM1166 High Mobility Multi-Purpose Wheeled Vehicle in Support of a Rapid Fielding Initiative, October 11, 2006
- Capabilities and Limitations Report for the XM1166 High Mobility Multi-Purpose Wheeled Vehicle, October 2006
- Defense Contract Audit Agency Audit Report No. 1621-2007D27000001, February 20, 2007
- Contract No. W56HZV-08-C-0178 with AM General, December 21, 2007
- High Mobility Multi-Purpose Wheeled Vehicle Acquisition Plan, September 9, 2008
- System Evaluation Plan for the Next Generation Expanded Capacity Vehicle, September 2008
- Summary of Data from Validated High Mobility Multi-Purpose Wheeled Vehicle Life Cycle Cost Estimate, November 24, 2008
- Draft Test and Evaluation Master Plan for the High Mobility Multi-Purpose Wheeled Vehicle: Next Generation Expanded Capacity Vehicle, December 1, 2008

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- Acquisition Decision Memorandum for the High Mobility Multi-Purpose Wheeled Vehicle Family of Vehicles and Expanded Capacity Vehicle 2, March 9, 2009
- Under Secretary of Defense for Acquisition, Technology, and Logistics memorandum on the Designation of the High Mobility Multi-Purpose Wheeled Vehicle Program an Acquisition Category IC, November 20, 2009

(U) We contacted staff in the Offices of the Under Secretary of Defense for Acquisition, Technology, and Logistics; the Director, Operational Test and Evaluation; the Director, Program Analysis and Evaluation; the Deputy Chief of Staff of the Army (G-3/5/7); the Deputy Chief of Staff of the Army (G-8); the Assistant Secretary of the Army (Acquisition, Logistics, and Technology); Program Executive Officer for Combat Support and Combat Service Support; Project Manager for Tactical Vehicles; Project Manager for Joint Combat Support Systems; U.S. Army Training and Doctrine Command; and Army Test and Evaluation Command to determine why the Army planned to acquire the ECV2 to replace the current Expanded Capacity Vehicle (ECV)-model HMMWV without first establishing the program as a new start, planning to obtain full and open competition, or determining whether other current or projected tactical wheeled vehicles already provided the capabilities planned for the ECV2 Program.

(U) In addition, we contacted contractor representatives from AM General to discuss how and why the ECV2 development effort began, the cost of the development, and the capabilities of the vehicle.

(U) We also contacted the staffs of the Marine Corps Systems Command, Marine Corps Combat Development Command, Marine Corps Logistics Command, and Red River Army Depot to determine the feasibility of recapitalizing the current HMMWVs to the XM1166 configuration. In addition, on June 17, 2009, the audit team inspected M1114-, M1151-, and XM1166-model HMMWVs at the Marine Corps Base Quantico, Virginia.

(U) We compared the documents reviewed and testimonial evidence given to Federal, DOD, and Army regulations and guidance regarding acquisition, contracting, requirements, and testing.

(U) The potential monetary benefits identified in Finding B were calculated using the estimated purchase price of an ECV2¹ multiplied by the number of vehicles the Project Manager for Tactical Vehicles planned to procure.² The draft Justification Review

¹ (U) The purchase price of an ECV2 in the 2008 HMMWV Life Cycle Cost Estimate is \$334,000.

² (U) The draft Justification Review Document for Other than Full and Open Competition stated that the Project Manager Tactical Vehicles planned to procure 11,500 ECV2s.

Document for Other than Full and Open Competition stated that representatives from TACOM Life Cycle Management Command planned to procure ECV2s from FY 2010 to FY 2013.

(U) We experienced a delay and resistance in obtaining information on the XM1166 effort that required elevation to higher Army management levels. In May 2009, we asked the Project Manager for Tactical Vehicles to confirm our understanding of the history of the XM1166 effort and add any additional information. Three weeks later, the Project Manager provided a limited response and did not provide any supporting documentation. Based on the Project Manager's response, we met with the Military Deputy to the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) to discuss our concerns about the overall XM1166 effort. During that meeting, the Deputy Program Executive Officer for Combat Support and Combat Service Support stated that he did not believe the audit team had the full story regarding the XM1166. Two and a half weeks later, the Office of the Project Manager for Tactical Vehicles, under new leadership, provided a chronology of XM1166 events as well as 58 supporting documents and met with us for discussions.

Use of Computer-Processed Data (U)

(U) We did not use computer-processed data to perform this audit.

Use of Technical Assistance (U)

(U) The Technical Assessment Directorate, Office of the Deputy Inspector General for Policy and Oversight, assisted the audit team by comparing the technical advantages of the XM1166 with those of the M1151-model HMMWV.

Prior Coverage (U)

(U) During the last 5 years, the Government Accountability Office (GAO), the Department of Defense Inspector General (DOD IG), and the Army Audit Agency have issued six reports discussing tactical wheeled vehicle strategies, vehicle armoring, and vehicle survivability. Unrestricted GAO reports can be accessed over the Internet at <http://www.gao.gov>. Unrestricted DOD IG reports can be accessed at <http://www.dodig.mil/audit/reports>.

GAO (U)

(U) GAO Report No. GAO-06-274, "Defense Logistics: Lack of a Synchronized Approach between the Marine Corps and Army Affected Timely Production and Installation of Marine Corps Truck Armor," June 22, 2006

DOD IG (U)

(U) DOD IG Report No. D2009-046, "Procurement and Delivery of Joint Service Armor Protected Vehicles," January 29, 2009

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(U) DOD IG Report No. D2009-030, "Marine Corps Implementation of the Urgent Universal Needs Process for Mine Resistant Ambush Protected Vehicles," December 8, 2008

(U) DOD IG Report No. D2008-089, "Planning Armor Requirements for the Family of Medium Tactical Vehicles," May 9, 2008

(U) DOD IG Report No. D2007-107, "Procurement Policy for Armored Vehicles," June 27, 2007

Army (U)

(U) Army Audit Agency Report No. A-2007-0234-ALM, "Tactical Wheeled Vehicle Strategy, Deputy Chief of Staff G-8 and Program Executive Office Combat Support and Combat Service Support," September 26, 2007

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Appendix B. Available Competitive Procedures (U)

(U) Federal Acquisition Regulation Subpart 6.1, “Full and Open Competition,” sets the policies and procedures that are to be used to promote and provide for full and open competition. Specifically, the Subpart lists the following competitive procedures that are available in fulfilling the full and open competition requirement:

- (a) Sealed bids
- (b) Competitive proposals*
- (c) Combination of competitive procedures
- (d) Other competitive procedures
 - (1) Selection of sources for architect-engineer contracts in accordance with the provisions of 40 United States Code 1102 is a competitive procedure.
 - (2) Competitive selection of basic and applied research and that part of development not related to the development of a specific system or hardware procurement is a competitive procedure if award results from:
 - (i) A broad agency announcement that is general in nature identifying areas of research interest, including criteria for selecting proposals, and soliciting the participation of all offerors capable of satisfying the Government’s needs; and
 - (ii) A peer or scientific review.
 - (3) Use of multiple award schedules issued under the procedures established by the Administrator of General Services consistent with the requirement of 41 United States Code 259(b)(3)(A) for the multiple award schedule program of the General Services Administration is a competitive procedure.

* (U) If sealed bids are not appropriate, contracting officers shall request competitive proposals or use the other competitive procedures listed in sections (c) and (d).






Appendix C. Acquisition of the Next Generation Expanded Capacity Vehicle (U)

(U) The following chart illustrates how the Project Manager for Tactical Vehicles planned to procure 11,500 Next Generation Expanded Capacity Vehicles (ECV2s) for an estimated \$3.84 billion. The chart focuses on six key areas of the proposed acquisition: requirements, funding, oversight, acquisition strategy, testing, and life-cycle cost. Those categories divide the chart vertically into six sections.

(U) The chart is then divided horizontally into three sections. The top section lists the DOD acquisition requirements that pertain to requirements, funding, oversight, acquisition strategy, testing, and life-cycle cost and their importance in executing a successful acquisition program. The middle section of the chart lists the document, type of funding, or level of oversight used for the ECV2 Program in each of the six areas mentioned previously. If there is a problem with managing an acquisition program in that manner, it is signified by a red flag in the bottom section of the chart and followed by an explanation. The acronyms used on the chart are defined below.

(U) Acronyms

ACAT	Acquisition Category
ECV	Expanded Capacity Vehicle
ECV2	Next Generation Expanded Capacity Vehicle
HMMWV	High Mobility Multi-Purpose Wheeled Vehicle
IED	Improvised Explosive Device

	Requirements	Funding	Oversight	Acquisition Strategy	Testing	Life Cycle Cost
DoD Acquisition Requirements ECV2 Program	Capability Development Documents (U) Capability development documents are used to support the initiation of acquisition programs, refine the integrated architecture, and clarify how the program will lead to a joint warfighting capability. The documents also provide the detailed operational performance parameters necessary to complete the design of the proposed system.	Full funding for development and production (U) Full funding is defined as the inclusion of the dollars and personnel costs needed for all current and future efforts to carry out an acquisition. It has been a longstanding DOD policy to seek full funding for acquisition programs, and it is a necessary condition for program stability.	Acquisition Category I (U) ACAT I programs are subject to the highest level of oversight of all DOD acquisition programs and require the most program documentation to support their development and production decisions.	Full and open competition (U) Full and open competition helps to ensure the Army will procure the best vehicle for the best price.	Approved Testing (U) Test plans approved by the Office of the Director, Operational Test and Evaluation, will allow the Army to conduct a formal operational test, which will determine whether a vehicle meets user requirements.	Achieving Affordability (U) Life-cycle cost estimates are used as a means of determining affordability. In addition, the maintenance program should be designed to minimize total life-cycle cost while achieving readiness and sustainability objectives.
	(U) September 2004 HMMWV Operational Requirements Document	(U) Production funding appropriated for the ECV-model HMMWV program	(U) Acquisition Category III	(U) September 2008 HMMWV Acquisition Plan	(U) Draft ECV2 Test and Evaluation Master Plan	(U) November 2008 HMMWV Life Cycle Cost Estimate
	(U) Requirement insufficient for the current threat environment  (U) The survivability requirements contained in the HMMWV Operational Requirements Document are insufficient for the current threat. In a related example, the Secretary of Defense cancelled the Manned Ground Vehicle portion of the Future Combat System because it did not incorporate lessons learned in Iraq and Afghanistan with regard to underbody IEDs.	(U) Funding appropriated to procure one system is used to develop a new, different system  (U) The Army requested Other Procurement, Army funding for the ECV-model HMMWV program. (U) The Project Manager did not request RDT&E ³ funding to develop an ECV2-type vehicle. Instead, he used production funding authorized for the ECV-model HMMWV to partially fund the development of the ECV2 and was planning to use that funding to procure ECV2s. (U) Because the ECV2 is substantially a new vehicle, the Project Manager needed to request authorization to reprogram the ECV production funds, or request a new funding line to procure the ECV2.	(U) Inadequate level of oversight  (U) The Project Manager maintained that the ECV2 is part of the HMMWV family of vehicles and therefore is an ACAT III program. (U) However, procurement of ECV2s would cost about \$3.84 billion and would qualify the ECV2 as an ACAT I program. ¹	(U) No competition  (U) The Project Manager's acquisition plan was to buy ECV2s from AM General citing that AM General was the only known and responsible source. (U) This strategy did not meet Federal Acquisition Regulation competition requirements and did not state how many ECV2s the Army planned to procure or how much they cost. (U) Numerous other vendors may have been interested in an ECV2 procurement had they known it was estimated to be a multibillion-dollar program.	(U) Unapproved testing  (U) The Office of the Director, Operational Test and Evaluation, placed the ECV2 on all three of its testing oversight lists by 2009. ² (U) The Office of the Director, Operational Test and Evaluation, did not approve the Test and Evaluation Master Plan, yet the Project Manager allowed testing to commence. (U) Preliminary developmental test results showed the ECV2 was not meeting reliability, availability, and maintainability requirements in the HMMWV Operational Requirements Document.	(U) More expensive to maintain than current vehicle platform (U) The ECV2 is 72 percent more expensive to maintain than an ECV-model HMMWV according to the Life Cycle Cost Estimate. (U) The ECV2 has few parts in common with the ECV-model HMMWV and therefore will require a separate logistics chain.

¹ (U) On November 20, 2009, the Under Secretary of Defense for Acquisition, Technology, and Logistics designated the HMMWV Program an Acquisition Category IC, major Defense acquisition program. He also required the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) to notify him if the Army plans to procure a new model or variant of the HMMWV.

² (U) In June 2008, the Director, Operational Test and Evaluation, added the ECV2 Program to the Office of the Secretary of Defense Test and Evaluation Oversight List for Operational and Live Fire Testing. In January 2009, the Director added the ECV2 to the Oversight List for Developmental Testing.

³ (U) RDT&E stands for research, development, test, and evaluation.

Appendix D. Management Comments on the Findings and Our Response (U)

(U) Summaries of the comments from the Deputy for Acquisition and Systems Management, Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) on the findings follow, along with our responses. The complete text of the Deputy's comments can be found in the Management Comments section at the end of the report.

Comments on the Review of Internal Controls (U)

(U) The Deputy for Acquisition and Systems Management stated that the Next Generation Expanded Capacity Vehicle (ECV2) Program was based on the validated 2004 High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) operational requirements document and was coordinated through the milestone decision authority, indicating an appropriate evolution. He also stated that the Product Manager for Light Tactical Vehicles, desiring competition for the ECV2 Program, conducted a market survey to assess whether any other companies could meet the schedule requirements for ECV2 test assets but found no viable alternatives.

Our Response (U)

(U) As an acquisition category (ACAT) III program, the ECV2 may have been based on the validated 2004 HMMWV operational requirements document and coordinated through the Program Executive Officer for Combat Support and Combat Service Support (Program Executive Officer), the milestone decision authority. However, the Project Manager for Tactical Vehicles (Project Manager) represented the ECV2 as a HMMWV variant when it was substantially a new vehicle developed by AM General, and the Army planned to use current ECV-model HMMWV production funding to procure the ECV2.

(U) As discussed in Finding B, the Army planned to spend about \$3.84 billion on the ECV2 procurement. DOD Instruction 5000.2 states that block upgrades, planned product improvements, and similar efforts that provide a significant increase in operational capability and meet an ACAT threshold will be managed as separate increments. Similarly, Army Pamphlet 73-1 requires that any modification of sufficient cost and complexity to qualify as an ACAT I, major Defense acquisition program, be considered for management purposes as a separate acquisition effort. As discussed in Finding B, by not managing it as a separate acquisition effort, the Project Manager did not give the Under Secretary of Defense for Acquisition, Technology, and Logistics the full knowledge or the required oversight of the ECV2 Program. The scope of the ECV2 investment meets the dollar threshold requirement for a major Defense acquisition program and should have been placed under the oversight of the Under Secretary of Defense for Acquisition, Technology, and Logistics so that he could decide who should be the milestone decision authority.

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(U) We also do not agree that the September 2007 Federal Business Opportunities Notice was sufficient to provide for and promote full and open competition for a \$3.84 billion program. The Notice did not mention that the Project Manager for Tactical Vehicles' planned to purchase 11,500 ECV2s. It merely mentioned the Project Manager's intent to procure 15 test vehicles from AM General and, if test results were successful, to procure future production vehicles on a sole-source basis. In addition, a representative from the Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) also stated that in his opinion the Project Manager had not provided adequate support for the planned sole-source procurement of 11,500 ECV2s.

(U) The draft Justification Review Document for Other than Full and Open Competition for HMMWV Production, used by TACOM Life Cycle Management Command to support the sole-source ECV2 procurement, stated that only one responsible source was available to produce ECV2s and, therefore, the procurement was exempt from full and open competition. As stated in Finding B, the Joint Light Tactical Vehicle (JLTV) is being developed by the Army and the Marine Corps as the future light tactical vehicle to replace a portion of the HMMWV fleet. Fourteen manufacturers have expressed interest in the JLTV Program. Although the JLTV requirements differ from those for the ECV2, we have no reason to believe that one or more of those manufacturers could not produce an ECV2-type vehicle. Accordingly, we still maintain that the procurement of the ECV2 did not qualify for the exemption from full and open competition under the Federal Acquisition Regulation (FAR). In addition, by not fulfilling competition requirements, the Project Manager did not have the information necessary to ensure that the Army would be buying the best vehicle to meet user requirements for the best price.

Comments on Live Fire Test and Evaluation (U)

(U) The Deputy for Acquisition and Systems Management quoted the portion of Finding A that explained what systems are covered by live fire test and evaluation. He then stated that the HMMWV is an ACAT III program and that the Army and Defense Acquisition Executive have full knowledge of it. He also stated that, although documentation has been submitted requesting that the Project Manager review the ECV2 Program for possible redesignation as an ACAT I program (major Defense acquisition program), the decision was not made at the time the Army was evaluating the ECV2 Program.

Our Response (U)

(U) In the report, we did not discuss live fire testing in reference to the ECV2 Program. As to the XM1166, which was funded as part of the HMMWV program, the Army did not consider it a major Defense acquisition program at the time the Project Manager was evaluating it. Since then, the Under Secretary of Defense for Acquisition, Technology, and Logistics has designated the HMMWV a major Defense acquisition program, and the HMMWV is on the Office of the Secretary of Defense Test and Evaluation Oversight List for live fire testing. Any further testing done on the XM1166 or on any other recapitalized HMMWV configuration will be done under the oversight of the Director, Operational Test and Evaluation.

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Comments on Payload Capabilities (U)

(U) The Deputy for Acquisition and Systems Management stated that the XM1166 does not carry more payload than the M1151 and that both vehicles are estimated to carry 2,300 pounds of payload.

Our Response (U)

(U) The XM1166 is 528 pounds lighter than a comparably equipped M1151 with fragmentation kit 5. As a result, the XM1166, which has fragmentation kit 5-level protection built in, can carry 528 pounds more cargo, protection, or mission equipment. If no additional cargo, protection, or mission equipment is added, the XM1166 is 528 pounds lighter than the M1151 with fragmentation kit 5, thereby providing better mobility and improving reliability by reducing stress on the vehicle. A lightweight door solution was also developed for the XM1166 that reduced the weight of the vehicle by about 1,500 pounds. To clarify the sentence in Finding A, we revised the statement regarding the weight of the XM1166 to be clear that the XM1166 is lighter than a comparably equipped M1151 with fragmentation kit 5.

Comments on Protection Provided by the XM1166 (U)

~~(FOUO)~~ The Deputy for Acquisition and Systems Management stated that our statement, “However, the doors in the XM1166 have integrated fragmentation kit 5-level of protection in addition to the XM1166’s semimonocoque welded cab, which introduces improved crew survivability against [REDACTED] through significant structural improvements to the crew compartment compared with the M1151-model HMMWV,” did not appear to be supported in test documentation for test events against fragmentation kit 5-equipped vehicles. He stated that the Safety Confirmation for the XM1166 did not contain those words, and it only provided that assessment against the baseline M1114, not against the M1114- or M1151-model HMMWVs with fragmentation kits applied.*

Our Response (U)

~~(FOUO)~~ We agree that the XM1166 Safety Confirmation only provided an assessment of the capabilities of the XM1166 compared with the baseline HMMWV, not with the HMMWV with fragmentation kits applied. We also agree that the XM1166 Safety Confirmation does not use the phrase “improved survivability against [REDACTED] through structural improvements.” We used the Safety Confirmation in conjunction with other sources to reach our conclusion. In addition to the Safety Confirmation, we reviewed other test information and obtained testimony from Army and Joint Improvised Explosive Device Defeat Organization experts in vehicle survivability to reach our conclusion. Our conclusion that the XM1166 protects against [REDACTED] was inserted in the report to show the demonstrated effect of the XM1166 crew compartment improvements can have on crew survivability.*

* This paragraph omitted For Official Use Only information.

(FOUO) The Product Manager for Light Tactical Wheeled Vehicles stated in the November 16, 2009, brief on the HMMWV fleet recapitalization program that the crew compartment of the HMMWV must be [REDACTED]

[REDACTED] The brief identified the need to recapitalize the HMMWV fleet to increase survivability [REDACTED]

[REDACTED] As discussed in the report, the XM1166 has a welded cab structure, which helps prevent the vehicle from collapsing during [REDACTED] as opposed to the riveted structure of the M1151.*

Comments on the Feasibility of Recapitalizing Other HMMWVs to the XM1166 (U)

(FOUO) The Deputy for Acquisition and Systems Management commented on our statement that the Project Manager did not assess the feasibility of recapitalizing other HMMWV models to the XM1166 to gain greater protection against [REDACTED]. He stated that the statement “to gain greater protection against [REDACTED]” is vague and does not explain how it is greater. He also stated that the XM1166 provides lower protection against [REDACTED].*

Our Response (U)

(FOUO) We disagree. Throughout Finding A, we established how the design of the XM1166 offers advantages over the M1151-model HMMWV with fragmentation kit 5. Specifically, we stated that the XM1166 has:

- a crew compartment structure that features welded joints instead of the riveted joints of the M1151 and helps prevent the vehicle from collapsing during [REDACTED];*
- a thicker, welded underbody panel than the M1151, providing the warfighter increased protection from injury caused by [REDACTED];*
- an integrated energy-absorbing support structure on the battery box under the commander’s seat that reduces the effects of gross vehicle acceleration from [REDACTED] (which the M1151 does not have); and*
- thicker transparent door armor than the M1151, a feature that may help prevent injury to vehicle occupants from [REDACTED].*

(FOUO) We also disagree with the Deputy’s statement that the XM1166 provides lower protection against [REDACTED]. According to our review of available test reports, the XM1166 appears to provide superior [REDACTED] protection over that offered by the M1151 with fragmentation kit 5. However, a complete comparison of the capabilities of the two vehicles is impossible until the Army completes equivalent live fire tests on the XM1166 as were performed on the M1151 with fragmentation kit 5.* As stated earlier, the Product Manager for Light Tactical Wheeled Vehicles, in the November 16, 2009, brief on the

* This paragraph omitted For Official Use Only information.

HMMWV fleet recapitalization program, stated that the crew compartment of the HMMWV must be [REDACTED] and that the riveted M1151 does not have the [REDACTED]. In contrast, the XM1166 has a welded cab structure to help prevent the vehicle from collapsing during [REDACTED].*

Comments on the Welded Joints of the XM1166 (U)

(FOUO) Regarding our statements about the welded joints that make up the XM1166's crew compartment structure and its ability to help prevent the vehicle from collapsing during [REDACTED] the Deputy for Acquisition and Systems Management stated that, although the structures of the XM1166 and M1151 are different, the report did not provide supporting evidence from modeling or live fire tests for this conclusion. In addition, the Deputy stated that although the XM1166 does have a thicker underbody and thicker transparent side armor than the M1151-model HMMWV, there is no supporting documentation of enhanced protection against a relevant threat and threat positioning.*

Our Response (U)

(FOUO) We stated in the finding that the Army had not completed enough live fire testing and modeling and simulation on the XM1166 to make a complete performance comparison between the XM1166 and the M1151. A complete performance comparison of the two vehicles is impossible until the Army completes equivalent live fire tests on the XM1166 as were performed on the M1151 with fragmentation kit 5. Because those tests are incomplete, we relied on the judgment of experts. The Product Manager for Light Tactical Wheeled Vehicles also acknowledged, in the November 16, 2009, brief on the HMMWV fleet recapitalization program, that the crew compartment of the HMMWV must be [REDACTED] (such as the XM1166) and that an [REDACTED].*

(S) Further, we disagree that there is no supporting documentation of enhanced protection by the thicker underbody of the XM1166 as compared with the M1151. Although the XM1166 and M1151 with fragmentation kit 5 were not subjected to all of the same live fire tests, both vehicles were tested against [REDACTED]. The test reports stated that the M1151 had [REDACTED] but the XM1166 had [REDACTED]. Although this is just one test, the results highlight the potential that the XM1166 structural improvements have for crew survivability.†

(U) We agree with the statement that there is no supporting documentation of enhanced protection by the thicker transparent armor on the XM1166 because the Army has not tested the side window glass of the XM1166. Because ballistic tests on the side window glass of the XM1166 are incomplete, we relied on the judgment of experts in the Army

* This paragraph omitted For Official Use Only information.

† This paragraph omitted classified information.

Test and Evaluation Command. A September 2006 Army Test and Evaluation Command brief on the XM1166 stated that, although testers had not characterized the performance of the side window glass, they expected good performance because the glass was relatively thick. Further, we stated in the finding that recent improvements in ballistic glass allow for equal protection from thinner panes or increased protection from the same thickness of the glass based on comments made by the Product Manager for Light Tactical Vehicles.

Comments on XM1166 Test Results (U)

(U) The Deputy for Acquisition and Systems Management stated that appropriate tests were conducted on the XM1166 as required in support of an Urgent Materiel Release. Further, he explained that, although the November 2006 Capabilities and Limitations Report for the XM1166 stated that insufficient assets were provided for ballistics testing and that additional IED test events were needed to fully characterize the XM1166's ballistic survivability, this is common language across many platforms that were developed as solutions to meet urgent operational needs. He stated that this statement could be added as a footnote or incorporated in the report.

Our Response (U)

(~~FOUO~~) If, as the Deputy asserted, only urgent materiel release-level testing was completed on the XM1166, the Army still needs to perform full-up system-level live fire test and evaluation on the XM1166 in accordance with the M1151 test plan. Only then will the Army will be able to determine the exact capabilities that the welded structure of the XM1166 offers. Then the Army can decide which HMMWV configuration will best protect occupants of the HMMWV against [REDACTED] and proceed with recapitalization. Accordingly, we did not modify the report as the Deputy requested.*

Comments on Protection Provided by the M1151-Model HMMWV (U)

(~~FOUO~~) The Deputy for Acquisition and Systems Management commented on a paragraph that detailed the protection provided by the M1151-model HMMWV from various threats. He stated that, subsequent to vulnerability testing, the Project Manager upgraded the C-pillar with a 1-inch aluminum plate, and that the modification was cut into production and retrofit kits were provided to theater. He added that fragmentation kit 5 was a [REDACTED] He also stated that fragmentation kit 7, which is currently being fielded, [REDACTED]

Our Response (U)

(S) We agree with the Deputy's comment that the Project Manager upgraded the C-pillar with a 1-inch aluminum plate. However, as stated in Finding A, the XM1166 crew

* This paragraph omitted For Official Use Only information.

compartment structure has welded joints versus the riveted joints on the M1151. The welded joints help prevent the vehicle from collapsing during [REDACTED]. Although ballistic testing indicates that fragmentation kit 7¹ may provide increased protection against [REDACTED] it adds an additional 960 pounds to the 15,400-pound gross vehicle weight of the M1151 with fragmentation kit 5 and the objective gunner's protection kit. Accordingly, the fragmentation kit 7 can be installed only on the M1151 with fragmentation kit 5, not on the M1151 with fragmentation kit 6.*

(FOUO) As stated in Finding A, the XM1166, as opposed to the M1151, has enhanced survivability characteristics without additional weight. For example, the underbody panel of the XM1166 is four times thicker than that of the M1151. Fragmentation kit 4, which would provide [REDACTED] to the HMMWV, would add an additional 151 pounds² to the gross vehicle weight. The Product Manager did not field fragmentation kit 4 because of weight constraints. In addition, the Product Manager for Light Tactical Wheeled Vehicles stated in the November 16, 2009, brief on the HMMWV fleet recapitalization program that the [REDACTED] does not allow the installation of fragmentation kit 4 to provide [REDACTED]. On the other hand, a modification to the XM1166 made it even lighter. A lightweight door solution³ was developed for the XM1166 that reduced the weight of the vehicle by about 1,500 pounds.[†]

Comments on North Atlantic Treaty Organization Study (U)

(FOUO) The Deputy for Acquisition and Systems Management stated that although the Product Manager for Light Tactical Vehicles is aware of the North Atlantic Treaty Organization study that showed [REDACTED] the comment implies that the enemy in theater has demonstrated a distinct tendency. Further, the Product Manager is unaware of any National Ground Intelligence Center assessment that shows the current enemy, with the exception of snipers, is targeting windows.[†]

Our Response (U)

(FOUO) We disagree. Our report quotes a Joint Improvised Explosive Device Defeat Organization assertion that the enemy has [REDACTED]. This statement is not implied by our report; it is a Joint Improvised Explosive Device Defeat Organization assertion. The findings in the North Atlantic Treaty Organization study reinforce the findings of enemy tendencies contained in the Joint Improvised Explosive Device Defeat Organization statement.[†] We did not assert in the report that

¹ (FOUO) Fragmentation kit 7 provides [REDACTED].*

* This paragraph omitted classified and For Official Use Only information.

² (U) The weight of fragmentation kit 4 for the M1151 is an engineering estimate.

³ (U) The lightweight door solution developed for the XM1166 does not provide fragmentation kit 5-level protection.

[†] This paragraph omitted For Official Use Only information.

National Ground Intelligence Center had evaluated enemy tendencies for shooting at vehicles in Southwest Asia, and a representative of the National Ground Intelligence Center confirmed it has not evaluated such tendencies.

Comments on Acceleration Mitigation Requirements (U)

(U) The Deputy for Acquisition and Systems Management stated that there are no acceleration requirements for all seat positions in the HMMWV, but that there are requirements for survivability. He explained that there are several ways to mitigate acceleration forces including controlling the forces at the base of the seat. He added that the M1151 meets the survivability requirement and that the report incorrectly concentrates on a specific material used, instead of on the results achieved. Finally, with respect to the M1152-model HMMWV mine test, he stated that anamorphic dummies were positioned in two crew locations to measure acceleration forces.

Our Response (U)

(U) We did not state that there were acceleration requirements established for all seat positions. We quoted the Project Manager, who said: “the acceleration mitigation requirement for all seats is the same and the commander’s seat used in the M1151 passed the mine survivability requirements established in the 2004 HMMWV Operational Requirements Document in a test on the M1152-model HMMWV.”

~~(S)~~ We further highlighted in Finding A that the Product Manager for Light Tactical Vehicles stated that the commander’s seat cushion in the M1151 incorporates a rubber acceleration mitigation device. The Army Test and Evaluation Command found, however, when conducting tests of a [REDACTED]

[REDACTED] M1151 on June 17, 2009, that the commander’s seat [REDACTED]

[REDACTED] The test [REDACTED]

[REDACTED] However, more than two-thirds of antivehicular landmines weigh more than 13 pounds.⁴ The [REDACTED] test was not representative of the majority of the mine threat.*

(U) Also, the Deputy’s statement that anamorphic dummies were positioned in the two crew locations to measure acceleration forces appears to be incorrect. The Army Test and Evaluation Command provided the audit team with an excerpt from the results of that M1152-model HMMWV mine test, and it clearly shows that no anamorphic dummies were instrumented to measure for acceleration injuries. We sent a copy of the

⁴ (U) An approximation based on information obtained from the Technical Cooperation Program’s Conventional Weapons Technology Group, “Protection of Soft-Skinned Vehicle Occupants from Landmine Effects, Technical Report,” 2^d edition, September 1999.

* This paragraph omitted classified information.

test results to the Product Manager for Light Tactical Vehicles and inquired why anamorphic dummies were not instrumented to measure acceleration. We received no answer.

(U) The Product Manager for Light Tactical Vehicles initiated the XM1166 development effort because he was concerned that the commander's seat in the M1151 would not meet the September 2004 HMMWV operational requirements document's requirements for mine protection. With this in mind, the Product Manager should have ensured that the anamorphic dummies were instrumented to measure for acceleration injuries in the M1152-model HMMWV as well as in the XM1166 for comparison purposes.

Comments on Recapitalization Strategies (U)

(U) The Deputy for Acquisition and Systems Management commented on our statement regarding why the XM1166 was not considered in the predecisional Light Tactical Vehicle Fleet Management and Investment Strategy by the Army Deputy Chief of Staff (G-8).⁵ The Deputy stated that the XM1166 was not type classified, did not have a full materiel release, and did not meet current Army Deputy Chief of Staff (G-3/5/7)-validated requirements. As a result, the XM1166 was not included in current authorized Army budget documents and was not included in the Strategy. The Deputy further stated that Synchronization Staff Officers from the Army Deputy Chief of Staff (G-8) were aware of the XM1166.

(U) The Deputy also commented on our statement that a representative from Red River Army Depot in Texarkana, Texas, stated that recapitalizing current HMMWVs to the XM1166 model was an excellent proposition. The Deputy stated that the Product Manager was currently recapitalizing the M1097R1-model HMMWV. The Deputy added that there was no validated requirement for additional HMMWVs in theater beyond those being upgraded with fragmentation kit 6.

Our Response (U)

(U) The Army Deputy Chief of Staff (G-8), Deputy Division Chief, Focused Logistics Division, Force Development Directorate, whose Division wrote the Army Tactical Wheeled Investment Strategy, advised us his division did not include the XM1166 in its Strategy because staff did not know about the vehicle; we cannot speculate on additional reasons. Additionally, other vehicles, such as the ECV2, that also do not meet all of the Deputy's criteria above were considered in the Army Tactical Wheeled Vehicle Investment Strategy.⁶

⁵ (U) On October 30, 2009, the Army Deputy Chief of Staff (G-8) approved the Army Tactical Wheeled Vehicle Investment Strategy.

⁶ (U) Although the Army Deputy Chief of Staff (G-8) stated that the Army Tactical Wheeled Vehicle Investment Strategy, dated October 30, 2009, mentions the ECV2, it recommends that the Army not procure it because the vehicle will have inadequate underbody IED protection and only 30-percent commonality of parts with the current HMMWV fleet.

(U) Contrary to the Deputy's assertion, the Army also plans to recapitalize up-armored HMMWVs. Specifically, the Product Manager for Light Tactical Wheeled Vehicles, in the November 16, 2009, brief on the HMMWV fleet recapitalization program, and the Army Deputy Chief of Staff (G-8) in the Tactical Wheeled Vehicle Investment Strategy, October 30, 2009, specified that the HMMWV recapitalization program would include up-armored HMMWVs as well as the M1097.

Comments on the Army Management of the Next Generation Expanded Capacity Vehicle (U)

(U) The Deputy for Acquisition and Systems Management stated that the assessment of the ECV2 as a HMMWV variant would provide the Army another capability, but was not intended to replace all HMMWVs. Further, Headquarters, Department of the Army, would have to identify how many, if any, ECV2s would be desired, and base that decision on funding and priorities.

Our Response (U)

(U) We did not state in the report that the Army intended for the ECV2 to replace all HMMWVs, as the Deputy asserted. There are approximately 150,000 HMMWVs in the Army inventory, and the Project Manager planned to buy only 11,500 ECV2s.

Comments on the Deferment of the ECV2 Procurement (U)

(U) Regarding the deferment of the acquisition of ECV2s, the Deputy for Acquisition and Systems Management stated that the decision was independent of our audit. He also stated he did not believe there is supporting documentation for the ECV2 funding being put to better use as we stated in the report.

Our Response (U)

(U) We did state that after our discussions with all levels of Army acquisition management, bringing to light the Project Manager's plans to award the contract for the 11,500 ECV2s, that the Project Manager deferred acquisition of the ECV2. We firmly believe that our discussions helped lead to the deferment of the ECV2 acquisition.

(U) Funds set aside to procure the ECV2s will be put to better use because they will not be used to acquire 11,500 vehicles in a sole-source procurement that would duplicate the capabilities of or not be as capable as other tactical vehicles being acquired.

(U) The Defense acquisition system is the management process by which DOD provides effective, affordable, and timely systems to users. It exists to manage the Nation's investments in technologies, programs, and product support necessary to achieve the National Security Strategy and support the warfighter. The primary objective of Defense acquisition is to acquire quality products that satisfy user needs with measurable improvements to mission capability and operational support, in a timely manner, and at a fair and reasonable price. In the planned sole-source procurement of 11,500 ECV2s, the

Army was not going to meet those objectives, especially in times of declining Defense budgets. Specifically, the Army spent about \$58 million⁷ to promote the sole-source ECV2 Program when competition should have been pursued. To that extent, the Army wasted \$58 million on the development and testing of the ECV2. In addition, since the program was incorrectly classified as an ACAT III program, the Program Executive Officer and the Project Manager may have abused their authority in trying to procure \$3.84 billion worth of ECV2s through a sole-source contract when the decision should have been that of the Under Secretary of Defense for Acquisition, Technology, and Logistics. We do not mean to imply that project managers should not have the ability to explore upgrades to currently fielded systems, or search for better systems to replace what we already have to provide measurable improvements to mission capability. However, we do not endorse masking a program the size and complexity of the ECV2 as an evolutionary upgrade and then spending millions of dollars on its development and testing when, in fact, it would duplicate the capabilities of or not be as capable as other tactical vehicles being acquired.

Comments on Defense Acquisition System Requirements (U)

(U) The Deputy for Acquisition and Systems Management disagreed with our statement that the Project Manager did not give the Under Secretary of Defense for Acquisition, Technology, and Logistics the full knowledge and appropriate oversight of the ECV2 Program by not managing it as a separate acquisition effort. He stated that the ECV2 “had Office of the Secretary of Defense visibility” since the HMMWV was included on the Office of the Secretary of Defense Live Fire Test and Evaluation Oversight List.

Our Response (U)

(U) If the ECV2 procurement had been appropriately managed in accordance with the DOD 5000 series of regulations and categorized as a new start, major Defense acquisition program, the Under Secretary of Defense for Acquisition, Technology, and Logistics would have had the opportunity to determine who would be the milestone decision authority. The milestone decision authority has oversight over all aspects of the acquisition and not just its live fire testing. When the Project Manager was pursuing the ECV2 Program, the milestone decision authority was the Program Executive Officer.

⁷ (U) According to a representative from the TACOM Life Cycle Management Command, the Army has indirectly invested about \$35 million in the development of the ECV2. According to a representative from the Office of the Project Manager for Tactical Vehicles, the Army spent about \$22.8 million on the testing of the ECV2. The sum of the indirect investment in the development of the ECV2 and its testing is \$58 million.

Glossary (U)

(U) Acquisition Category. An acquisition category facilitates decentralized decision making and execution as well as compliance with statutorily imposed requirements. The categories determine the level of review, decision authority, and applicable procedures. Acquisition categories include I, II, III, and IV. The following is a definition for an Acquisition Category I:

(U) Acquisition Category I. An Acquisition Category I program is defined as a major Defense acquisition program estimated by the Under Secretary of Defense for Acquisition, Technology, and Logistics to require an eventual expenditure of research, development, test, and evaluation funds of more than \$365 million in FY 2000 constant dollars, or of procurement funds of more than \$2.19 billion in FY 2000 constant dollars, or is designated by the Under Secretary of Defense for Acquisition, Technology, and Logistics to be an Acquisition Category I program. Acquisition Category I programs have two subcategories: Acquisition Category ID and Acquisition Category IC. The Under Secretary of Defense for Acquisition, Technology, and Logistics designates programs as Acquisition Category ID and Acquisition Category IC.

(U) Acquisition Category ID. For this category, the Under Secretary of Defense for Acquisition, Technology, and Logistics is the milestone decision authority. The “D” refers to the Defense Acquisition Board that advises the Under Secretary of Defense for Acquisition, Technology, and Logistics at major decision points.

(U) Acquisition Category IC. For this category, the DOD Component Head or, if delegated, the DOD Component Acquisition Executive, is the milestone decision authority. The “C” refers to Component.

(U) Acquisition Strategy. An acquisition strategy is a business and technical management approach designed to achieve program objectives within resource constraints. It is the framework for planning, directing, contracting for, and managing a program. The acquisition strategy provides a master schedule for research, development, test, production, fielding, modification, postproduction management, and other activities essential for program success. It is the basis for formulating functional plans and strategies such as the test and evaluation master plan, the acquisition plan, and the competition strategy.

(U) Anamorphic Dummy. An anamorphic dummy is one that is jointed and weighted to represent a human. It is used in impact testing in vehicles to show how a human body would respond in the same situation.

(U) Curb Weight. Curb weight is defined as the weight of a ground vehicle including fuel, lubricants, coolant, and on-vehicle material, but excluding cargo and operating personnel.

SECRET

(U) Fragmentation Armor Kits. High Mobility Multi-Purpose Wheeled Vehicles can be equipped with the following armor kits, separately or in combination:

(FOUO) Fragmentation Kit 4. Fragmentation kit 4, [REDACTED] would add an additional 151 pounds (an engineering estimate) to the gross vehicle weight. However, the Product Manager for Light Tactical Vehicles did not field fragmentation kit 4 because of weight constraints.*

(FOUO) Fragmentation Kit 5. Fragmentation kit 5 includes improvements to the [REDACTED] Fragmentation kit 5 vehicles typically include the [REDACTED] Gross vehicle weights of HMMWVs with the fragmentation kit 5 and objective gunner's protection kit components are approximately 15,400 pounds. Objective fragmentation kit 5 provides [REDACTED] and includes fragmentation kits 1 and 2, which provide [REDACTED].*

(FOUO) Fragmentation Kit 6. Fragmentation kit 6 is an integrated kit that includes some components from fragmentation kit 7 and [REDACTED]. Fragmentation kit 6 includes [REDACTED] Gross vehicle weights of HMMWVs with the fragmentation kit 6 upgrades are approximately 17,400 pounds.*

(FOUO) Fragmentation Kit 7. Fragmentation kit 7 includes an [REDACTED] Gross vehicle weights of HMMWVs with fragmentation kit 7 upgrades are approximately 16,300 pounds. Fragmentation kit 7 can be installed only on HMMWVs with fragmentation kit 5, not on HMMWVs with fragmentation kit 6.*

(U) Gross Vehicle Weight. Gross vehicle weight is the curb weight of the vehicle plus personnel and their individual equipment and weapons, and payload. Payload includes nonessential mission kits, such as a cargo compartment heater kit, crew protection and winch kits, and radios.

(U) High Mobility Multi-Purpose Wheeled Vehicle (HMMWV). The HMMWV is a lightweight, highly mobile, diesel-powered, four-wheel-drive tactical vehicle that uses a common chassis to carry a wide variety of military hardware, ranging from machine guns to tube-launched, optically tracked, wire command-guided antitank missile launchers. There are 15 HMMWV configurations, consisting of cargo and troop carriers, weapons carriers, ambulances, and shelter carriers. The variants share a common engine, chassis, and transmission, with 44 interchangeable parts that are used in more than 1 position.

* This paragraph omitted For Official Use Only information.

SECRET

(U) Up-Armored HMMWV. The up-armored HMMWV is a production-model HMMWV that is required by warfighters operating in Operation Iraqi Freedom and Operation Enduring Freedom. Up-armored HMMWVs feature ballistic-resistant windows and steel-plate armor on the doors and underside to protect against rifle rounds and explosive blasts, fragmentation protections, and additional armor for the turret gunner on the roof. The up-armored HMMWV also has a powerful air-conditioning system.

(U) Improvised Explosive Device (IED). An IED is a bomb constructed and deployed in ways other than in conventional military action. An IED may be partially made up of conventional military explosives, such as an artillery round, attached to a detonating mechanism.

(U) Independent Research and Development (IR&D). IR&D consists of contractor self-initiated projects falling within basic research, applied research, development, or systems and other concept formulation studies. It does not include the costs of effort sponsored by a grant or required in the performance of a contract. An IR&D effort should not include technical effort expended in developing and preparing technical data specifically to support submitting a bid or proposal.

(U) Joint Light Tactical Vehicle (JLTV). The JLTV is an Army-led multi-Service initiative to develop a family of future light tactical vehicles to replace many of the HMMWVs in service. There are three categories of JLTVs being developed.

(U) Category A. Category A vehicles are intended for general-purpose mobility and would carry a 3,500-pound payload.

(U) Category B. Category B vehicles are intended to serve as infantry carriers, command and control and reconnaissance vehicles, and weapons carriers and would carry a 4,000- to 4,500-pound payload.

(U) Category C. Category C vehicles are intended to serve as shelter carriers, prime movers, and ambulances and would carry a 5,100-pound payload.

(U) Mine Resistant Ambush Protected-All-Terrain Vehicle (M-ATV). The M-ATV is a scaled-down, all-terrain, four-wheel offspring of the larger Mine Resistant Ambush Protected vehicle. The M-ATV is one of the first vehicles designed with Afghanistan in mind. The M-ATV includes a significantly increased power-to-weight ratio, a turbo-charged diesel V8 engine, a shorter wheelbase for improved cross-country mobility, and a lower center of gravity for increased maneuverability.

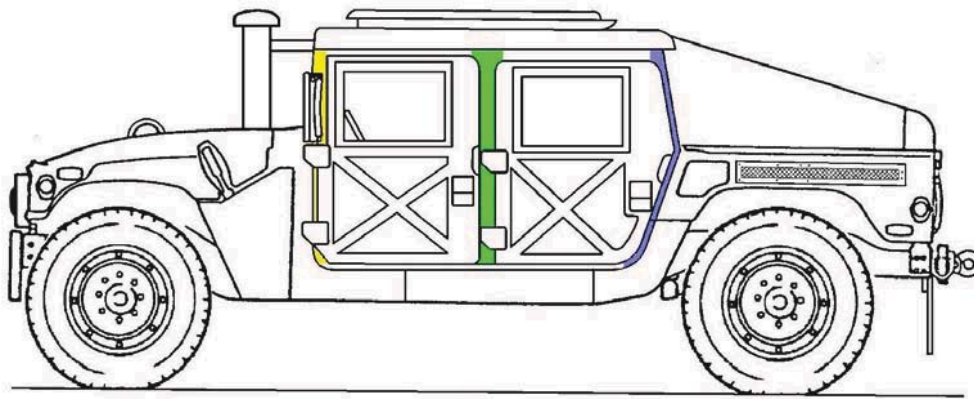
(U) Mine. A mine is an explosive weapon hidden underground or underwater that triggers when an individual or vehicle moves over it or is nearby. Mines are often placed in groups, forming a mine field. Because of the use of mines, most nations now include specialist mine disposal teams in their armed forces.

SECRET

(U) **Monocoque Vehicle.** In a monocoque vehicle, the body is combined with the chassis in a single unit that utilizes the external skin to support some of the load. This type of vehicle construction is an alternative to using an internal frame or chassis that is covered with cosmetic body panels.

(U) **Pillar.** A vehicle pillar is a vertical beam of material that supports its structure. HMMWVs have three pillars: an A-pillar, a B-pillar, and a C-pillar. See the yellow, green, and purple shaded areas, respectively, in the figure below for the location of each of the pillars.

(U) **M1151-Model HMMWV with A-, B-, and C-Pillars Highlighted**



(U) **Recapitalization.** Recapitalization involves the complete rebuild of currently fielded systems to like-new condition. The objectives of the recapitalization process include extending service life, reducing operating and support costs, enhancing capability, and improving system reliability. Recapitalization can be further subdivided into rebuild and upgrade processes, which are funded with Operation and Maintenance appropriations and Procurement appropriations, respectively.

(U) **Reliability Enhanced Vehicle.** The Reliability Enhanced Vehicle is an upgrade to the HMMWV platform. It was designed by AM General to withstand the environment in Southwest Asia under increased payload demands. The development of the Reliability Enhanced Vehicle began in mid-2006, and the vehicles are now in full production. Some of the improvements to the platform include a geared fan drive, a new power steering pump, new shock absorbers, and a new three-piece frame rail and crossmembers. These improvements were made to the M1151-, M1152-, and M1165-model HMMWVs. Reliability Enhanced Vehicles have a serial number of 300,000 and above.

Director, Operational Test and Evaluation Comments (U)

(UNCLASSIFIED)



OFFICE OF THE SECRETARY OF DEFENSE
1700 DEFENSE PENTAGON
WASHINGTON, DC 20301-1700

OCT 13 2009

MEMORANDUM FOR DEPARTMENT OF DEFENSE (DoD) INSPECTOR
GENERAL (IG)

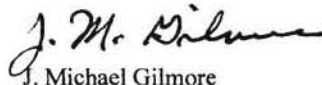
SUBJECT: Recapitalization and Acquisition of Light Tactical Wheeled Vehicles (DoD
IG Project No. D2009-D000AE-0007.000)

Thank you for the opportunity to review and comment on the subject draft report. I have reviewed the referenced report and per your request, comments regarding recommendation A.2. are provided below. In addition, relevant information is provided for your consideration regarding recommendation A.1.c.

DOT&E concurs with your recommendation A.2, "the Director, Operational Test and Evaluation, add the XM1166 vehicle to the Office of the Secretary of Defense Test and Evaluation Oversight List for live fire test and evaluation oversight." Although DOT&E agrees that oversight of this program is appropriate, the High Mobility Multi-purpose Wheeled Vehicle (HMMWV) Armor program, which encompasses the XM1166 as well as all other HMMWV variants, has been on the Office of the Secretary of Defense Test and Evaluation Oversight List for live fire test and evaluation since 2006. Therefore, adding the XM1166 as a separate program on the Oversight List is unnecessary.

With respect to A.1.c., DOT&E will require adequate live fire and operational tests to determine the effectiveness, suitability and survivability of the XM1166 in the event the Secretary of the Army decides to recapitalize the current HMMWV fleet. This potential XM1166 test program would verify your assumption that the semimonocoque hull provides increased crew protection as compared to the M1151 HMMWV. It is not apparent from our review of the XM1166 data that the semimonocoque hull alone provides an increase in crew protection.

I will continue to make my staff available to you as your office prepares its final report. My point of contact on this matter is my deputy for Live Fire Test and Evaluation, [REDACTED].


J. Michael Gilmore
Director



(UNCLASSIFIED)

Assistant Secretary of the Army (Acquisition, Logistics, and Technology) Comments (U)



SAAL-SMS

(UNCLASSIFIED)

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY
ACQUISITION LOGISTICS AND TECHNOLOGY
103 ARMY PENTAGON
WASHINGTON DC 20310

OCT 23 2009

MEMORANDUM FOR Inspector General, Department of Defense

SUBJECT: DoDIG Draft Report - "Acquisition and Recapitalization of Light Tactical Wheeled Vehicles" - Project D2009-D000AE-007.000

1. Thank you for the opportunity to review and comment on the DoDIG Draft Report - "Acquisition and Recapitalization of Light Tactical Wheeled Vehicles" - Project D2009-D000AE-007.000. Specifically, you asked ASA (ALT) to respond to recommendations contained in paragraphs A and B.

a. The HMMWV has completed the DoD Live Fire Test Requirements in accordance with OSD Live Fire Test and Evaluation (LFTE). Therefore, ASA (ALT) does not concur with the recommendations in paragraph A to continue to test XM1166. Additionally, the Army has not laid out a requirement that would establish a need to recapitalize the HMMWV fleet to the XM1166 or similar capability. Therefore, ASA(ALT) does not concur with determining the feasibility or planning for the recapitalization of the HMMWV fleet to the XM1166.

b. The Army has decided to take no further action on the Next Generation Expanded Capacity Vehicles (ECV2), therefore ASA (ALT) does not concur with the recommendations contained in paragraph B. Should the Army revisit the ECV2, the recommendations contained within paragraph B will be taken under consideration in the acquisition planning.

2. Additional comments to the report are attached in the enclosure.

3. The point of contact is [REDACTED] at [REDACTED], or e-mail:
[REDACTED]

Encl

R. Mark Brown
Brigadier General, GS
Deputy for Acquisition and
Systems Management

FOUO

(UNCLASSIFIED)

(UNCLASSIFIED)

Audit of Army Acquisition Actions in Response to the Threat to Light Tactical Wheeled Vehicles (Project No. D2009-D000AE-0007.000)

ASA (ALT) Review of DoDIG Draft Report

Recommendations:

A.1.a. Nonconcur. The HMMWV has completed DoD Live Fire Test Requirements IAW OSD Life Fire Test and Evaluation (LFTE).

A.1.b. Nonconcur. The HMMWV has completed DoD Live Fire Test Requirement IAW OSD LFTE. HMMWVs are not being Recapped to AOR threat levels. The XM1166 would not meet HMMWV ORD requirements.

A.1.c. Nonconcur. The HMMWV has completed DoD Live Fire Test Requirement IAW OSD LFTE. HMMWVs are not being Recapped to AOR threat levels. The XM1166 would not meet HMMWV ORD requirements.

A.2. The HMMWV is already on the Oversight List.

B.1. The Army is taking no further action on the Next Generation Expanded Capacity Vehicles.

B.2.a. The Army is taking no further action on the Next Generation Expanded Capacity Vehicles.

B.2.b. The Army is taking no further action on the Next Generation Expanded Capacity Vehicles.

Page 2, Armor for High Mobility Multipurpose Wheeled Vehicles (1st Paragraph)

(U) Correction: This paragraph should be classified as SECRET.

Revised, Page 2

Page 4, Review of Internal Controls

Statement

(U) "...Specifically, the Project manager Tactical Vehicles planned to acquire the ECV2 to replace the current ECV model HMMWV without first determining through the Joint Capabilities Integration and Development System process whether current or projected tactical wheeled vehicles already provide the capabilities planned for the ECV2 Program without establishing the ECV2 Program as a new start, and without planning to obtain full and open competition."

Comment

(U) Correction: The ECV2 project was based upon the validated 2004 HMMWV ORD and coordinated through the Milestone Decision Authority that the effort represented an appropriate evolution of the program. Product Manager Light Tactical Vehicles conducted a market survey to assess if another company could meet the schedule and requirements for test assets. No viable alternatives were found. This attempt highlights the desire for competition within the PM.

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Page 5, Live Fire Test and Evaluation

Statement

(U) "By law, a covered system is any vehicle, weapon platform, or conventional weapon system that includes features designed to provide some degree of protection to users in combat and that is an ACAT I or II program.

Comment

(U) Note: The HMMWV is an ACAT III program, with the full knowledge of the Army and Defense Acquisition Executive. Although documentation has been submitted requesting review to ACAT I, that decision was not made at the time the ECV2 effort was evaluated.

Page 5, XM1166 Configuration

Statement

(U) "The XM1166 can carry 528 pounds more payload than the M1151 with fragmentation kit 5 under full combat load."

Comment

(U) Correction: The XM1166 does not carry more payload, the payload of the M1151 and XM1166 are both estimated at 2,300-lbs.

Page 7, Cessation of Army Acquisition, 2nd paragraph

Statement

~~(U//FOUO)~~ "However, the doors in the XM1166 have integrated fragmentation kit 5 level protection in addition to the XM1166's semimonocoque welded cab, which introduces improved crew survivability against [REDACTED] through significant structural improvements to the crew compartment as compared with the M1151 model HMMWV *

Comment

(U) Note: The statement of "against [REDACTED]" does not appear to be supported in test events against FK5 equipped vehicles. The Safety confirmation for the XM1166 does not contain those words and only provides that assessment against the baseline M1114, not the M1114 or M1151 with fragmentation kits applied *

Page 7, XM1166 Test Results

Statement

~~(U//FOUO)~~ "The November 2006 Capabilities and Limitations Report for the XM1166 stated that insufficient XM1166 assets were provided for ballistics testing and that additional IED test events were needed to fully characterize the XM1166's ballistic survivability. Accordingly, a complete analysis of the XM1166 as compared with the M1151 is not possible until all necessary tests are conducted on the XM1166." †

Comment

(U) Note: The XM1166 conducted the appropriate tests as required in support of Urgent Material Release. The statement of insufficient test assets is common language across many platforms for solutions developed to meet Urgent Operation needs. (Reference the CLR for the M1151 and M1114 fragmentation kit 5). This comment could be added as a footnote if not incorporated into the body of the paragraph.

Page 8, HMMWV Protection Requirements, 1st paragraph

Statement

(U) Statement on M1151 with fragmentation kit and opaque armor requirements.

Comment

(U) Subsequent to vulnerability testing the PM upgraded the C-pillar with 1" aluminum plate. The modification was cut into production and retrofit kits were provided to

* This paragraph omitted For Official Use Only information.

† This paragraph does not contain any For Official Use Only information.

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Theater. Frag Kit 5 was a side threat solution and did not include roof upgrades. Frag Kit 7, currently being fielded, improves overhead protection.

**Page 8, HMMWV Protection Requirements, 2nd paragraph
Statement**

{U//FOUO} "Further, in a large-scale North Atlantic Treaty Organization test in which the subjects were not told of the experiments' purpose, [REDACTED]

[REDACTED] In this context, it is worth noting that the side windows of the XM1166 are about 22 percent thicker than those on the M1151 with fragmentation kit 5 installed." *

Comment

{U//FOUO} Note: This note was identified during our initial report review and remains valid. This comment implies that the current enemy in Theater has demonstrated a distinct tendency. PM LTV is aware of the NATO report which highlighted that skilled and trained soldiers will shoot at windows, but the PM is unaware of any NGIC assessment that the current enemy had or is [REDACTED]

*

**Page 10, Gross Vehicle Acceleration, 2nd paragraph
Statement**

{U//FOUO} "The Project Manager stated the acceleration mitigation requirement for all seats is the same and that the commander's seat used in the M1151 passed the mine survivability requirements established in the 2004 HMMWV Operational Requirements Document in a test on the M1152 model HMMWV. However, the mine test conducted under the front commander's side wheel did not measure for acceleration injuries"[†]

Comment

{U//FOUO} Correction: There are no acceleration requirements for all seat positions. The requirements are for crew survivability. How the system is designed to mitigate the acceleration forces from a system level event may include, but are not limited to, controlling the forces at the seat base. Anamorphic dummies were positioned in the two crew locations to measure acceleration forces.[†]

**Page 12, Recapitalization of the HMMWV
Statement**

(U) "The Army Deputy Chief of Staff (G-8), in the April 2009 pre-decisional Light Tactical Vehicle Fleet Management and Investment Strategy, recommended ending HMMWV production in FY2010; continuing the recapitalization of the M1151, M1152, M1165 and M1167 model HMMWVs; and using depot facilities for modernization. A representative of the Army Deputy Chief of Staff (G-8) stated that the XM1166 was not considered in the pre-decisional Light Tactical Vehicle Fleet Management and Investment Strategy because the Army Deputy Chief of Staff (G-8) was unaware of the vehicle's existence."

Comment

(U) Note: The XM1166 was not type classified, does not have a Full Material Release and does not meet current validated HQDA G3 requirements. Therefore, it is not included in the current authorized P-forms and would not have been included in the draft and predecisional Light Tactical Vehicle Fleet Management and Investment Strategy. HQDA G8 SSO's were aware of the project.

* This paragraph omitted For Official Use Only information.

[†] This paragraph does not contain any For Official Use Only information.

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Page 12, Project Manager Actions**Statement**

~~(U//FOUO)~~ "The Project Manager had not assessed the feasibility of recapitalizing other HMMWV models to the XM1166 to gain greater protection against [REDACTED]. A representative from Red River Army Depot in Texarkana, Texas, stated that recapitalizing current HMMWVs to the XM1166 model was an excellent proposition because the U.S. Government owns a level three technical data package for the XM1166." *

Comment

(U) Correction: Statement of "to gain greater protection against [REDACTED]" is vague and doesn't explain how it is greater. The XM1166 also provides lower protection against [REDACTED].

Note: Current recapitalization of HMMWVs is for the M1097R1. *

Page 13, Conclusion**Statement**

~~(U//FOUO)~~ "The XM1166 crew compartment structure, which features welded joints instead of the riveted joints of the M1151, helps to prevent the vehicle from collapsing during an [REDACTED]." *

Comment

(U) Note: Although the structures are different, report did not provide supporting evidence from modeling or live fire events for this conclusion.

Statement

~~(U//FOUO)~~ "The XM1166 has a thicker, welded, underbody panel than the M1151, which provides the warfighter increased protection from injury caused by [REDACTED]." *

Comment

(U) Note: Although the XM1166 does have a thicker underbody, there is no supporting documentation of enhanced protection against a relevant threat and threat positioning.

Statement

~~(U//FOUO)~~ "Unlike the M1151, the XM1166 has an integrated, energy-absorbing support structure on the battery box under the commander's seat that reduces the effects of gross vehicle acceleration from an [REDACTED]." *

Comment

(U) Note: Reducing the effects of gross vehicle acceleration from an [REDACTED] event includes a system level approach of which energy absorbing mechanics or materials may be a component. The M1151 meets the requirement of the system. The report incorrectly concentrates on a specific material used instead of on the results achieved. Further, the report states in a related footnote that while the M1151 commander's seat cushion has a rubber acceleration mitigation device, the Army did not test this device to measure for acceleration injuries. All mine shots included anamorphic dummies to measure acceleration forces. *

Statement

~~(U//FOUO)~~ "The XM1166 has thicker transparent door armor than the M1151, a feature that may help prevent injury to vehicle occupants from [REDACTED]." *

* This paragraph omitted For Official Use Only information.

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Added, Page 9

Revised, Page 11

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Audit of Army Acquisition Actions in Response to the Threat to Light Tactical Wheeled Vehicles (Project No. D2009-D000AE-0007.000)

Comment

(U) Note: Although the XM1166 does have thicker side transparent armor, there is no supporting documentation of enhanced protection against a relevant threat and threat positioning.

Statement

~~(U//FOUO)~~ "The XM1166 provides additional payload capacity over the currently fielded M1151 with fragmentation kit 5 installed."†

Comment

(U) Correction: The XM1166 does not carry more payload. As stated previously in comments, the payload of both vehicles is the same, estimated at 2,300-lbs.

Page 13, Conclusion, 2nd paragraph

Statement

(U) "IEDs are a major cause of death and injury in Iraq and Afghanistan. With the semimonocoque cab of the XM1166, recapitalized HMMWVs may provide increased protection from [REDACTED]" *

Comment

(U) Note: There is no validated requirement for additional HMMWVs in Theater beyond those being upgraded with fragmentation kit 6. Recapitalization of HMMWVs to XM1166s would give the Army a system that is not type classified, does not have Full Material Release and does not meet the requirements of HQDA G3.

Statement

(U) "In addition, as discussed in Finding B, the HMMWV program has crossed the threshold for an ACAT I program and meets the definition of a covered system for live fire testing. Accordingly, the Director, Operation Test and Evaluation, needs to add the XM1166 to the Live Fire Test and Evaluation Oversight List."

Comment

(U) Note: The HMMWV is already included on the LFTE Oversight List. There is no need to specify a specific model. Should the Army decide to pursue the XM1166 variant it would by default be included in LFTE Oversight.

Page 14, Recommendations

Statement

(U) "A.1. We recommend that the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) direct the Program Executive Officer for Combat Support and Combat Service Support to:

(U) "a. Continue live fire tests on the XM1166 in accordance with the M1151 test plan to ensure the test results of the XM1166 and M1151 are comparable."

Comment

Nonconcur. The HMMWV has completed DoD Live Fire Test Requirements IAW OSD Life Fire Test and Evaluation (LFTE).

Statement

* This paragraph omitted For Official Use Only information.

† This paragraph does not contain any For Official Use Only information.

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Audit of Army Acquisition Actions in Response to the Threat to Light Tactical Wheeled Vehicles (Project No. D2009-D000AE-0007.000)

(U) "b. Determine the feasibility of recapitalizing High Mobility Multi-Purpose Wheeled Vehicles currently in use to the XM1166, or similar, configuration to gain greater protection for soldiers against [REDACTED]" *

Comment

(U) The HMWV has completed DoD Live Fire Test Requirement IAW OSD LFTE. HMMWVs are not being Recapped to AOR threat levels. The XM1166 would not meet HMMWV ORD requirements.

Statement

(U) "c. If it is determined feasible, recapitalize current High Mobility Multi-Purpose Wheeled Vehicles to the XM1166, or similar, configuration to gain greater protection for soldiers against [REDACTED]" *

Comment

(U) The HMWV has completed DoD Live Fire Test Requirement IAW OSD LFTE. HMMWVs are not being Recapped to AOR threat levels. The XM1166 would not meet HMMWV ORD requirements.

Page 15, B. Army Management of the Next Generation Expanded Capacity Vehicle Acquisition, 1st paragraph

Statement

(U) "The Project Manager for Tactical Vehicles (Project Manager) planned to acquire the ECV2 to replace some of the current ECV model HMMWVs without first:

1) (U) "establishing the ECV2 Program as a new start acquisition program,"

Comment

(U) The MDA determined that the ECV2 effort was part of the HMMWV evolution.

Statement

2) (U) "planning to conduct full and open competition, or"

Comment

(U) Product Manager Light Tactical Vehicles conducted a market survey to assess if another company could meet the schedule and requirements for test assets. No viable alternatives were found. This attempt highlights the desire for competition within the PM.

Statement

3) (U) "determining through the Joint Capabilities Integration and Development System process whether the ECV2 Program will provide capabilities that will be provided by other current and projected tactical wheeled vehicles."

Comment

(U) The ECV2 project was an evolution of the HMMWV based upon the validated 2004 ORD.

Page 15, B. Army Management of the Next Generation Expanded Capacity Vehicle Acquisition, 2nd paragraph

Statement

(U) "As a result, the Project Manager did not plan to afford the Under Secretary of Defense for Acquisition, Technology and Logistics the opportunity or information to make an informed decision on the need to procure 11,500 ECV2s for \$3.84 billion. The ECV2 would duplicate the capabilities of, or not be as capable as, other tactical vehicles being acquired, such as the Mine Resistant Ambush Protected-All-Terrain Vehicle (M-ATV) and the Joint Light Tactical Vehicle (JLTV)."

Comment

* This paragraph omitted For Official Use Only information.

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Audit of Army Acquisition Actions in Response to the Threat to Light Tactical Wheeled Vehicles (Project No. D2009-D000AE-0007.000)

(U) Correction: The assessment of the ECV2 system as a HMMWV variant would provide the Army another capability, but was not intended to replace all HMMWV orders. It was considered a variant and HQDA would need to identify how many, if any, of the systems would be desired. Decision on quantities would be identified by HQDA based upon funding and priorities.

**Page 15, B. Army Management of the Next Generation Expanded Capacity Vehicle Acquisition, 3rd paragraph
Statement**

(U) "After our discussions with all levels of Army acquisition management, the Project Manager deferred the acquisition of the ECV2 in May 2009, and put the \$3.84 billion in funding to better use for FY 2010 through FY 2013."

Comment

(U) The decision to remove the ECV2 from p-forms was independent of the DoDIG audit. The statement "to better use" does not appear to have supporting documentation.

Page 18, Defense Acquisition System Requirements

Statement

~~(U//FOUO)~~ "By not managing it as a separate acquisition effort, the Project Manager did not give the Under Secretary of Defense for Acquisition, Technology, and Logistics the full knowledge and appropriate oversight of the ECV2 Program." *

Comment

~~(U//FOUO)~~ Correction: The ECV2 had Office of Secretary of Defense visibility, as the HMMWV is included in their oversight list for Live Fire Test and Evaluation *

Page 22, Conclusion, 2nd Paragraph

Statement

(U) "After our discussions with all levels of Army acquisition management, the Project Manager deferred the acquisition of the ECV2 in May 2009 and put the funding to better use."

Comment

(U) The decision to not pursue the ECV2 variants was independent of the DODIG audit. The statement "and put the funding to better use" is not supported in this document.

Page 22, Recommendations

Comment

(U) At this time, the report's recommendations are no longer valid, given that the ECV2 effort has been ended and brought to a logical conclusion as directed by the Project Manager and Program Executive Officer, and there is no funding currently available to support continuation.

* This paragraph does not contain any For Official Use Only information.

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U.S. Army Training and Doctrine Command Comments (U)

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REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY TRAINING AND DOCTRINE COMMAND
102 MCNAIR DRIVE
FORT MONROE, VIRGINIA 23651-1047

ATIR

6 October 2009

MEMORANDUM FOR Inspector General, Department of Defense, 400 Army Navy Drive, Arlington, VA 22202-4704

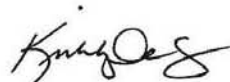
SUBJECT: Command Comments to Draft Report – Recapitalization and Acquisition of Light Tactical Wheeled Vehicles (Project No. D2009-D000AE-0007.000)

1. HQ TRADOC comments to the subject draft report are enclosed. We concur with comments to Recommendation B-1 as addressed to the Assistant Secretary of the Army (Acquisition, Logistics, and Technology), in coordination with the Commanding General, U.S. Army Training and Doctrine Command.

2. Point of contact is [REDACTED].

FOR THE COMMANDER:

Encl


KIMBERLY DAWN CYR
Director, Internal Review
And Audit Compliance

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Response to Draft Audit Report Recommendation

Draft Report, Recapitalization and Acquisition of Light Tactical
Wheeled Vehicles (Project No. D2009-D000AE-0007.000)

Recommendation B-1: We recommend that the Assistant Secretary of the Army (Acquisition, Logistics, and Technology), in coordination with the Commanding General, U.S. Army Training and Doctrine Command, perform an analysis of the capabilities of the High Mobility Multi-Purpose Wheeled Vehicle, Next Generation Expanded Capacity Vehicle, Mine Resistant Ambush Protected Vehicle, Mine Resistant Ambush Protected-All-Terrain Vehicle, and Joint Light Tactical Vehicle as part of the Joint Capabilities Integration and Development System process to determine the need for the Next Generation Expanded Capacity Vehicle before authorizing any future funding for the development, testing, and acquisition of Next Generation Expanded Capacity Vehicles.

TRADOC Response: Concur with comment. We recommend that Recommendation B-1 be revised to read: *The Assistant Secretary of the Army (Acquisition, Logistics, and Technology), in coordination with the Commanding General, U.S. Army Training and Doctrine Command, should continue to develop requirements for the next-generation of light tactical vehicles using the Joint Capabilities Integration and Development System process. This includes the Joint Light Tactical Vehicle program, with the mandated Analysis of Alternatives and Technology Development Phase.*

Rationale:

1. Stating that TRADOC should determine the future need for Next Generation Expanded Capacity Vehicle (ECV2) is inaccurate. Future needs are as stated in the Joint Requirements Oversight Council (JROC) approved Initial Capabilities Document (ICD), and in the Army Requirements Oversight Council (AROC) / Marine Corps Requirements Oversight Council (MROC) approved Capability Development Document (CDD).
2. The Joint Light Tactical Vehicle (JLTV) program is a direct result of the Joint Capabilities Integration and Development System (JCIDS) process. The required Capabilities Based Assessment process was used, to include U.S. Marine Corps and U.S. Army Functional Area Analyses and Functional Needs Analyses, and a jointly conducted Functional Solutions Analysis. These activities resulted in a DoD approved ICD in November 2006, and an AROC / MROC approved CDD in November 2007, CDD Version 2.7a. This CDD is being used for the JLTV Technology Development Phase. Three vendors are building JLTV prototypes that will undergo extensive developmental testing. The vendors were selected in accordance with a formal source selection process that used full and open competition. The CDD will be revised based on test results, the Analysis of Alternatives (AoA) and other analysis, and submitted to the

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JROC for approval. The AoA is on-going in support of a Milestone B decision anticipated to occur in 4Q FY 11.

3. The Functional Solutions Analysis, the Evaluation of Alternatives, and the ongoing AoA analyzed / will analyze the capabilities of currently fielded and future light tactical wheeled vehicles. The AoA will be conducted as directed by the Office of the Secretary of Defense Guidance for the Joint Light Tactical Vehicle Analysis of Alternatives, dated 17 January 2009. This guidance directs that the "Base Case" alternative will be the light tactical vehicle fleets programmed for FY 2013. The AoA will use several alternatives, which currently include HMMWV (as the Base Case FY 2013 LTV Fleet), Mine Resistant Ambush Protection (as a Commercial Off the Shelf (COTS) solution), and a New Start (JLTV). Given the HQ DA decision not to fund / procure the ECV2, it is not a member of the Base Case FY 2013 LTV Fleet.

Comments Approved by Chief, Sustainment Division, ARCIC

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Inspector General Department *of* Defense



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